FINANCIAL STABILITY REPORT

2014 / 2015

CNB CZECH NATIONAL BANK

FINANCIAL STABILITY REPORT 2014 / 2015

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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. An intensive debate about the tools of macroprudential regulation, i.e. the set of pre-emptive measures intended to prevent financial instability, is going on at international level. The European Systemic Risk Board (ESRB) has been operating at the European level since the start of 2011. Together with three pan-European sectoral supervisory authorities (EBA, ESMA and EIOPA) it makes up the European System of Financial Supervision (ESFS). If it identifies increased risks of a systemic nature, the ESRB issues warnings and recommendations to mitigate those risks. CNB representatives are involved directly in the ESRB's work; the CNB Governor and another board member are members of the General Board of the ESRB, and CNB experts participate in its working groups. Since 2011, the CNB has also been represented in the Regional Consultative Group of the Financial Stability Board established by the G20.

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

BOXES

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

The FSR is based on an advanced analytical and modelling framework, and stress tests of the key segments of the financial sector (i.e. banks, insurance companies and pension management companies), as well as a stress test of households, are integral parts of the FSR. The testing methodology has gradually been refined and several changes have been made since the previous FSR. In bank stress tests, the parameters of satellite models describing the evolution of some financial variables and risk measures were re-estimated. The FSR also contains the results of bottom-up micro stress tests conducted by the CNB in partnership with selected banks and insurance companies. The main refinements of the household stress test consist in enhanced modelling of flows between employment and unemployment and distinction between the short-term and long-term impacts of the interest rate shock.

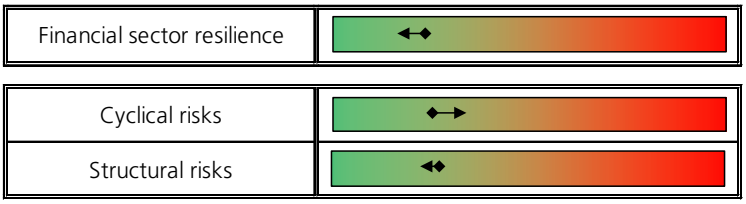
The financial sector's resilience is tested by means of an adverse macroeconomic stress scenario entitled the *Adverse Scenario*. This scenario, whose probability is very low, describes the risk of a pronounced and long-lasting decline in domestic economic activity caused mainly by low external demand.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

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

This Financial Stability Report was approved by the CNB Bank Board at its regular meeting on financial stability issues on 21 May 2015 and was published on 16 June 2015. It is available in electronic form at http://www.cnb.cz/.

PART I

OVERALL ASSESSMENT



The Czech financial sector has developed mostly favourably since spring 2014. The aggregate macroprudential dashboard[1] shows that the sector's already high resilience to potential adverse shocks has strengthened. This was due mainly to an increase in capital adequacy, favourable liquidity developments and positive changes in risk management by financial institutions. As regards potential sources of risks to financial stability in the future, the aggregate macroprudential dashboard indicates a slight increase in cyclical risks and a modest decline in structural risks. The increase in cyclical risks was due to a further fall in loan interest rates and interest margins, a recovery in demand for loans and an easing of credit standards, and a decline in returns on high-quality assets to very low levels. The modest decline in structural risks primarily reflects the introduction of a systemic risk buffer, a reduction in the interconnectedness of financial institutions and new legislation governing the activities of credit unions.

DEVELOPMENTS IN 2014 AND 2015 Q1

Advanced economies are gradually recovering

The global economy continued to record uneven growth in 2014, as characterised by slow growth in the euro area, a sizeable recovery of the US economy and fast growth in emerging economies. However, some emerging economies recorded slowing growth, owing to an unexpectedly sharp fall in prices of the energy commodities they export or to an increase in the volatility of capital flows. The Czech economy returned to economic growth in 2014. Besides a modest pick-up in GDP growth in its main trading partner countries and more pro-growth fiscal policy, the domestic economic recovery was aided by a weaker koruna, which, together with decline of interest rates, led to a substantial easing of the real monetary conditions.

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

Monetary policy in Europe remains very loose

Central banks in Europe further eased the economic conditions on concerns about strengthening deflationary pressures. Some lowered their monetary policy rates to negative values and used unconventional instruments. By contrast, the US Federal Reserve finished its quantitative easing programme and is expected to start tightening monetary policy at the end of this year. The CNB's monetary policy rate has been at "technical zero" since November 2012 and the CNB has been using the exchange rate as an additional instrument for easing the monetary conditions since November 2013. At its May meeting, the Bank Board confirmed the commitment to intervene on the foreign exchange market if needed to weaken the koruna against the euro so that the exchange rate is kept close to CZK 27 to the euro. It stated that the CNB would not discontinue the use of the exchange rate as a monetary policy instrument before the second half of 2016 and that it stands ready to adjust the level of the exchange rate commitment if there were to be a long-term increase in deflation pressures capable of causing, among other things, a slump in domestic demand or a systematic decrease in inflation expectations.

The financial condition of the non-financial corporate sector has improved, but remains differentiated

Both the performance and profitability of the non-financial corporations sector rose significantly in 2014. The financial situation of small enterprises did not improve much, however. The financial results of the energy sector deteriorated despite the economic recovery and a general improvement in the financial condition of most sectors. Overall credit growth in the corporate sector remained low in 2014 and 2015 Q1 despite favourable conditions on the credit supply side. The corporate sector's increasing export orientation is strengthening its dependence on the external environment. The escalation of geopolitical risks is increasing the potential riskiness of loans to non-residents and non-financial corporations with strong links to the countries concerned.

More favourable income conditions are having a positive effect on household debt indicators

The economic recovery helped improve the labour market situation. This had a positive effect on the financial condition of households. Growth in income coupled with a fall in interest rates on mortgage loans and consumer credit led to a decrease in the ratio of households' net interest payments to their gross disposable income. This favourable trend was not yet fully reflected in an improvement in household credit risk indicators. Their level was similar to that in 2013. The overall proportion of financially distressed households was also unchanged from the previous year. However, stress tests of households indicate a decline in the rate of distress in the quarters ahead.

Residential property prices continued rising, while activity in the commercial property market strengthened

Residential property prices rose modestly in 2014, but the trends remain mixed across regions. Growth in apartment prices accelerated in Prague, whereas in the rest of the Czech Republic the signs of a recovery observed last year weakened. The commercial property segment saw a surge in investment activity, which may reflect search for yield by foreign investors. However, the renewed construction of office property is leading to a further rise in the vacancy rate. The development activity is being financed largely from developers' own funds or from abroad.

The Czech financial sector developed favourably

The developments recorded in the Czech financial sector were positive in 2014. In an environment of economic recovery, the banking sector increased its profitability and strengthened its capital adequacy and liquidity. It is comfortably compliant with the new European regulatory rules. Deposits continued to increase despite an ongoing decline in deposit rates. Thanks to a high volume of residents' deposits, the domestic banking sector has long been independent of foreign sources of funding and its net external position remains positive. Insurance companies are well capitalised and most of them are maintaining stable profitability even in the current period of low interest rates. Investment funds are showing dynamic growth. The pension management companies sector is also stable. Following the abolition of the second pillar, planholders are saving in traditional transformed funds and new participation funds, which may have a riskier profile.

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

The resilience of the euro area financial sector strengthened

The results of a comprehensive assessment of banks' balance sheets prior to the launch of the Single Supervisory Mechanism in the banking union boosted the confidence of investors in the European banking system. Despite uncertainty surrounding repayments of Greek sovereign debt, the bond market situation has calmed, thanks in part to the ECB's unconventional monetary policy measures. Uncertainty surrounding the continuation of the economic recovery and deflationary pressures are significant sources of risks to financial stability in the euro area and in some other advanced countries. Central banks will therefore continue to pursue very easy monetary policy.

The historically low interest rates may encourage overvaluation of some assets

Low interest rates on loans and other sources of external financing are encouraging people to buy property or other assets in order to take advantage of the favourable conditions to attain better returns. This may result in some asset prices rising above levels consistent with the long-term trends in fundamental factors. A sudden change in market sentiment towards expectations of higher returns could lead to a sharp revaluation of bonds and sizeable market losses. However, this scenario is very unlikely, as there are factors that may result in long-term interest rates staying at historical lows for an extended period.

The Czech economy will continue to grow in 2015 and accelerate in 2016

According to the CNB's May forecast, economic activity will grow by 2.6% this year. This growth will be fostered by a recovery in external and domestic demand, an overall environment of easy monetary conditions, low oil prices and partly also rising government investment. It will accelerate further to 3.2% in 2016, reflected in a decline in the general unemployment rate and higher income growth. Household consumption expenditure will increase thanks to faster growth in wages and salaries, which are the main component of households' disposable income. The relatively robust economic growth will lead to a weakening of credit risk in the private sector. Domestic demand growth and the recovery in economic activity will be boosted by a decline in interest paid and a recovery in credit growth.

The risk of weak demand decreased as a result of the financial surpluses generated by households and corporations

In addition to potential renewed adverse developments in trading partner countries, a halt in domestic demand growth may pose a risk to the Czech economic recovery. Signals that the financial surpluses generated by corporations and households could have an adverse effect on aggregate domestic demand amid a decreasing government finance deficit intensified in 2014. The easy monetary conditions together with appropriate fiscal policy reduce the risk of a balance-sheet recession, i.e. a mismatch between expected future income and expenditure. Nevertheless, signals regarding the intensity of this risk must continue to be monitored.

The risk of domestic property prices becoming significantly overvalued is low for the present

An assessment of the degree of overvaluation/undervaluation of property prices is important for evaluating the risks associated with credit institutions' exposures to the property market. According to the CNB's new quantitative method, apartment prices can be regarded as having been slightly overvalued at the end of 2014. In line with the assumptions regarding the macroeconomic environment, modest but accelerating growth in residential property prices can be expected over the next two years. However, this growth does not imply any major deviation of prices from levels consistent with fundamental factors.

A potential renewed recession and a long period of low interest rates remain risks to the financial sector

Given the fragility of the economic recovery in Europe, the main risk scenario for the Czech financial sector is still a renewed economic recession leading to a sharp deterioration in its profitability. The profitability of credit institutions, whose income depends heavily on interest margins, could also be adversely affected by a continued decline in interest rate levels. Low interest rates will negatively affect the performance of insurance companies, too. The environment of very low interest rates also calls for increased prudence in interest rate risk management.

Credit risk dropped slightly, but the easing of credit standards may foster underestimation of such risk

The economic recovery helped reduce credit risk in most sectors of non-financial corporations and stabilise credit risk in households. The credit risk of both non-financial corporations and households is being suppressed by the relatively low debt ratios of these sectors and by low interest rates on loans. However, these may also become a source of vulnerability due to easier availability of loans. The softer lending conditions coupled with historically low interest rates may boost the interest of households and firms in new loans and increase their willingness to take on more debt. As the economy is starting to shift to a more expansionary phase of the business cycle, the CNB will closely monitor credit standards.

The quality of NPLs is decreasing, but other complementary indicators of credit risk suggest positive tendencies

The structure of non-performing loans (NPLs) is continuing to deteriorate in the form of migration to riskier subcategories. The coverage of NPLs by provisions rose slightly, but the deteriorating NPL structure means there is still risk of its appropriate level being underestimated. At the same time, there are substantial differences between banks in the prudence of NPL coverage. The amount of loans classified as performing but regarded as non-performing by other banks is decreasing. The volume of guarantees and loan commitments given to clients who have a loan classified as non-performing is also falling. Lending to the most risky segments dropped

and the default rates on loans provided by banks to non-financial corporations in 2014 were lower by comparison with new loans in previous years. The long-running decline in risk weights in large banks reversed as well.

The credit unions segment still poses a risk, but new legislation will help stabilise it

The adverse trends in the credit union segment continued in 2014. Credit risk in this segment is still much higher than in the case of banks and the NPL ratio rose further to almost 30%. New legislation adopted last year should lead to a reduction in the level of risk of this segment in future. However, increased attention will be needed as the segment adjusts to the new legislative requirements.

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

The resilience of the domestic financial system was assessed by means of stress tests on banks, insurance companies and pension management companies using alternative economic scenarios. The *Baseline Scenario* is considered by the CNB to be the most probable. The *Adverse Scenario*, whose probability is very low, describes the risk of a pronounced and long-lasting decline in domestic economic activity caused mainly by low external demand. The adverse economic situation will erode the financial reserves of households and non-financial corporations and cause a significant deterioration in their ability to service their debts. This will lead to sizeable credit losses in the banking sector. This scenario is supplemented in sensitivity analyses with other shocks, e.g. write-offs of claims on indebted EU countries and the collapse of the largest debtors of each bank. The *Adverse Scenario* also assumes a pronounced increase in long-term interest rates, which will result in financial institutions incurring losses due to market risk.

According to the stress tests, banks and insurance companies are highly resilient, but pension management companies show elevated sensitivity to interest rate risk

The stress tests demonstrate that the banking sector remains highly resilient to adverse scenarios even in a strong recession accompanied by deflation. While the *Baseline Scenario* predicts a slight decline in credit risk, materialisation of the *Adverse Scenario* would mean, among other things, that the banking sector's credit losses would more than triple over the three-year test horizon. However, the banking sector has a large capital buffer which enables it to absorb highly adverse shocks and maintain the sector's overall capital adequacy sufficiently above the regulatory threshold of 8% even in such an unfavourable scenario. Banks also passed a liquidity stress test, the methodology of which was extended to account for the new regulatory framework. The insurance company sector also showed sufficient resilience to an adverse scenario thanks to its large capital buffer. The pension management companies sector remains sensitive to an increase in yields on securities holdings.

SOURCES OF SYSTEMIC RISK AND MACROPRUDENTIAL POLICY

The current macroeconomic environment is heightening the importance of macroprudential policy

The combination of economic recovery and very easy monetary policies amid sufficient balance sheet liquidity of credit institutions is creating conditions for increased risk-taking and underestimation of risks. Given the fragility of the economic recovery, the high private and public sector debt levels in most advanced countries and the marked growth in the prices of many assets, financial institutions and their clients are exposed to a potential rise in credit and market risks to an increased extent. The

growing probability that central banks will continue to pursue very easy monetary policy and keep interest rates very low for an extended period is heightening the importance of preventive macroprudential policies.

The Czech economy is gradually bouncing back from the bottom of the financial cycle, and the countercyclical capital buffer rate remains at zero

The Czech economy is currently in a phase of the financial cycle that can be regarded as the onset of a recovery. The risk of excessive growth in lending remains low. The evolution of banks' credit standards is a major factor indicating a shift of the economy to an expansionary phase of the financial cycle. However, it has not yet been accompanied by changes in other types of cyclical risks. A zero countercyclical capital buffer rate will probably be applied in the next two years as well. However, this probability has decreased as a result of a recovery in credit growth, an easing of credit standards and a slight improvement in investment sentiment.

Loans for house purchase are becoming a potential source of systemic risk

Expectations of further property price growth combined with favourable conditions on the market for house purchase loans may become a source of systemic risk. Thanks to low interest rates, these loans are becoming more affordable for borrowers with lower and less stable income, who are more likely to experience repayment problems at times of rising interest rates or worse economic growth. At the same time, the attractiveness of buying to let is increasing. The growth in residential property prices and the increasing profitability of buying to let are creating potential for the emergence of a price spiral between property prices and housing loans.

The CNB is introducing a preventive macroprudential approach targeted at preventing future growth in risks in the area of loans secured by residential property

The CNB assesses the current configuration of credit standards in the segment of loans for house purchase as mostly conservative. At the same time, however, it sees growing diversity between banks' approaches and increasing tendencies to provide riskier loans for house purchase. This is indicated by the results of the CNB's survey of new loans secured by residential property. As these loans represent the largest part of the credit portfolio of domestic banks, the CNB deems it necessary to deploy preventive tools to counteract growth in the risks associated with providing such loans in the years ahead. These tools consist in a set of recommendations for credit institutions providing loans for house purchase. If the domestic property market started to show signs of overheating fostered by faster growth in lending in the years ahead, the CNB would tighten or extend the parameters of these recommendations or apply other tools defined in the CRD IV/CRR legislation. In particular, these tools include higher sector-specific risk weights for the calculation of capital requirements for banks.

The CNB has created a methodology for reviewing and assessing the systemic aspect of sovereign exposure concentration, but will not apply additional capital requirements under this methodology over the next three years

Given the continued growth in client deposits and subdued corporate demand for loans, credit institutions are allocating a significant proportion of their funds to government bonds (mainly Czech ones). As a result, credit institutions are displaying increased sovereign exposure concentration. CRD IV requires credit institutions to ensure consistent and effective management of concentration risk in their risk management systems. Concentrated sovereign exposures are no exception. However, it is difficult for individual institutions to assess the systemic aspect of this risk. The CNB has therefore prepared a new methodology for reviewing

and assessing the risk of systemic concentration of sovereign exposures under Pillar 2 (SREP). If the CNB comes to the conclusion that this risk is not sufficiently covered by an institution, it will decide on the basis of the above methodology to apply an additional capital requirement. A stress test of Czech public finance reveals that the current fiscal situation in the Czech Republic does not represent a threat to financial stability. Consequently, the CNB will not apply additional capital requirements to credit institutions at the three-year horizon.

The interconnectedness of financial institutions is tending to decrease

The evolution of assets and liabilities forming the links between institutions in the financial sector indicates a tendency towards a decrease in their interconnectedness. This weakens the structural component of systemic risk and reduces the risk of transmission of financial distress across segments in the event of adverse developments. The structural component of systemic risk is also being suppressed by the banking sector's large liquidity buffer.

Banks must be prudent in in their lending activities and subsequent loan classification, provisioning and NPL portfolio management.

The robust capital adequacy and high degree of liquidity and profitability of Czech banks form a stable basis for absorbing shocks. They are also of key importance for maintaining high public and investor confidence in the stability of the Czech banking sector and the financial sector as a whole. To preserve this positive situation, it is vital for banks to remain prudent in their lending activities, loan classification, collateral quality assessment, provisioning and NPL portfolio management.

Pension management companies should be more prudent with regard to interest rate risk

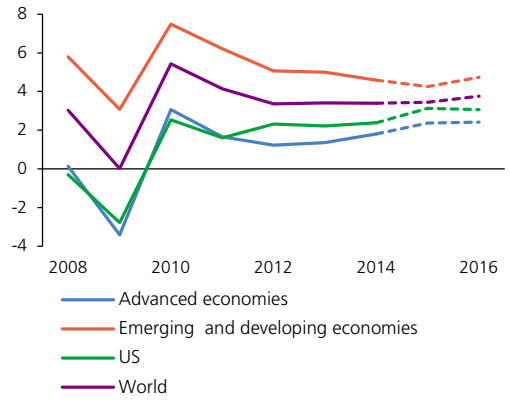
A sharp rise in interest rates from their current very low levels and an ensuing decline in the prices of debt securities held by pension management companies pose a potential risk to this sector. This would lead to negative valuation differences, as occurred in 2007–2009. Owners would have to inject large amounts of capital to meet the capital adequacy requirement. Pension management companies should therefore prudently assess the impact of such developments.

The CNB considers stabilisation of the regulatory framework in the EU to be a priority

Besides contributing positively to the stability of financial systems, the plethora of international and European regulatory initiatives rolled out in past years may have some unintended adverse consequences for the Czech banking sector, which has a traditional structure and is small compared to the euro area. One of the regulatory initiatives with potentially adverse effects is the directive on recovery and resolution of credit institutions and investment firms (BRRD). The CNB commented in detail on the draft regulatory technical standard on setting the minimum requirements for own funds and eligible liabilities (MREL) prepared by the European Banking Authority (EBA). The draft did not take sufficient account of conservative and locally oriented retail banks, which finance their activities fully or mostly from insured deposits. Were it to be implemented, it could have a negative effect on the asset and liability structure of domestic banks. Within the EBA, the CNB will lobby for resolution authorities to be allowed to take account of a bank's business model, mode of financing and risk profile when setting its MREL. The CNB's general priority is stabilisation of the regulatory framework. It is therefore cautious about the EU capital markets union project, which should be limited to minor steps until the functioning of the new regulatory framework for banks has been assessed.

CHART II.1

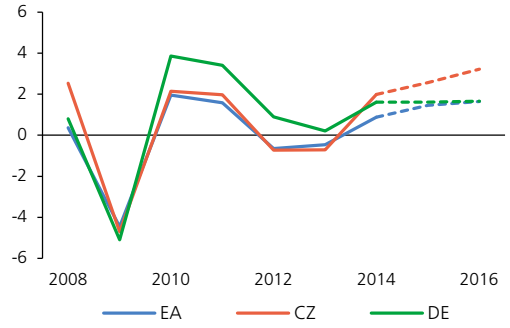
Economic growth in selected groups of countries and the USA
(year-on-year growth in %)



Source: IMF
Note: The dashed lines indicate the IMF's April 2015 forecasts.

CHART II.2

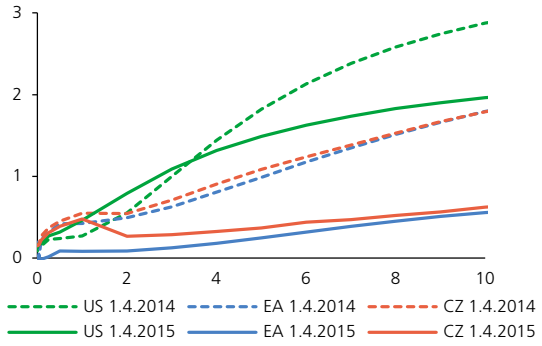
Economic growth in selected economies and the euro area
(year-on-year growth in %)



Source: CNB, IMF
Note: The dashed lines indicate the CNB's May 2015 forecast and the IMF's April 2015 forecasts.

CHART II.3

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



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

2 THE REAL ECONOMY AND FINANCIAL MARKETS

2.1 THE MACROECONOMIC AND FINANCIAL ENVIRONMENT

The advanced economies, including the euro area, experienced a gradual recovery in 2014 and early 2015. This recovery is still quite fragile, however. Faced with deflationary pressures, central banks in Europe further eased the monetary conditions significantly. This was reflected in a rise in prices of high-quality assets. A sharp correction of those prices could have a major effect on the financial sector, whose response would lead to an increase in overall financial market volatility. The uncertainties surrounding the geopolitical situation and the timing of the change in the monetary policy stance of key central banks could exacerbate this volatility. The very easy monetary conditions are also giving rise to a decline in yields on Czech government bonds, which, given their low liquidity, could become a source of vulnerability for the domestic financial sector. However, a potential return to recession and financial market instability in the euro area remain the primary risks to the Czech economy.

Economic activity is very mixed across world regions

The global economy continued to record uneven growth in 2014, as characterised by slow growth in the euro area, a sizeable recovery of the US economy and fast growth in some emerging economies. The economic growth outlooks for this year and the next indicate strengthening economic activity, and the euro area should also see a further recovery (see Charts II.1 and II.2). Last year, some emerging economies recorded slowing growth and a revision of their outlooks for 2015 and 2016 owing to an unexpectedly sharp fall in energy commodity prices. From the euro area perspective, this fall is a favourable supply shock which, together with a weak euro-dollar rate, supported a gradual economic recovery. Despite a temporary strengthening of deflationary pressures, the overall effect of the fall in oil prices on demand in European economies should be positive.

The monetary policies of European central banks remain very easy…

The uneven economic developments are being reflected in different central bank monetary policies. The US Federal Reserve decided to discontinue its quantitative easing (QE) programme last year and is expected to raise monetary policy rates in the second half of this year. By contrast, the ECB continued to ease the monetary conditions. Strengthening deflationary pressures forced it first to lower its monetary policy rates (the deposit facility rate even turned negative[1]) and then to start a QE programme. In September 2014 the ECB launched outright purchases of covered bonds and asset-backed securities. In March 2015 it expanded its activities to include purchases of government bonds of euro

1 The aim was to support bank lending to non-financial corporations in the euro area by increasing the effectiveness of targeted longer-term refinancing operations (TLTROs).

area countries.[2] The Swiss,[3] Danish and Swedish central banks also took radical action, cutting some of their monetary policy rates to negative values.

… giving rise to significant changes in long-term yields and encouraging search for yield

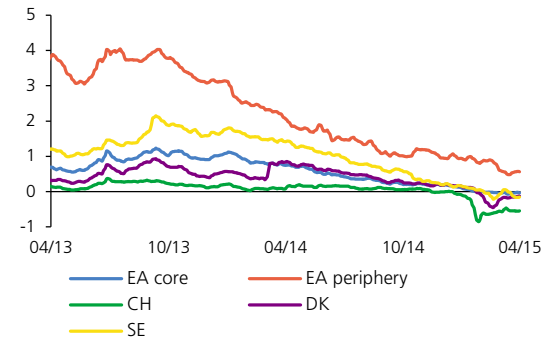
The changes in the settings of the monetary conditions were reflected in a renewed decline and flattening-out of yield curves (see Chart II.3). Long-term government bond yields in some European countries even turned negative (see Chart II.4). However, the situation is different for Greek government bonds, amid concerns about the government's ability to meet its commitments to creditors in the months ahead. In this context, Greece had its rating downgraded, which resulted in an increase in government bond yields. The trend seen in Europe also affected US yields, which likewise dropped at longer maturities (see Chart II.5). In response to this decline, many investors are trying to rebalance their portfolios towards higher-yield assets. This is exerting upward pressure on prices in riskier asset markets (see Chart II.6), where issuers' risk premia are simultaneously being squeezed.[4] In addition to speculative investors, the incentive to search for yield may be rising among financial institutions offering products with guaranteed yields, as such yields are currently hard to achieve with conservative strategies. This applies especially to insurance companies offering traditional life insurance products and to pension management companies.[5] However, the low-yield environment can also be expected to negatively affect the profitability of other financial institutions (see Box 3 in section 3.1).

The sustained low nominal yields are increasing the vulnerability of the financial sector…

The growth in asset prices across markets and regions is generally improving many of the financial soundness indicators of the holders of such assets, but it is simultaneously increasing the vulnerability of the financial system as a whole. A sudden downward correction of asset prices could lead to a sharp fall in market liquidity on global markets.[6] This could lead to a further decline in these asset prices, reflected in sizeable market losses. Given the high correlation of yields on different types of assets, contagion to other markets might occur. The evolution of US stock indices, which are now at all-time highs, suggests that a price correction is becoming increasingly likely.

CHART II.4

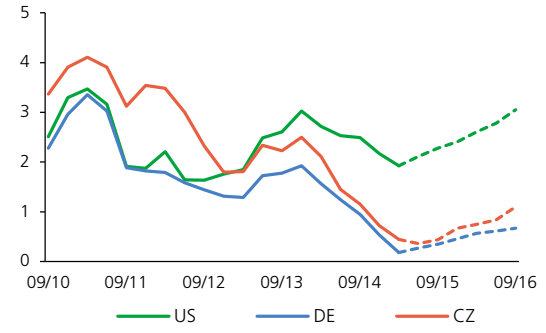
5Y government bond yields in selected European countries
(%)



Source: Thomson Reuters
Note: EA core comprises DE, BE, AT and NL. EA periphery consists of ES, IE, IT and PT. The figures for groups of countries are the simple means of the yields. The series are smoothed by the 5-day moving average.

CHART II.5

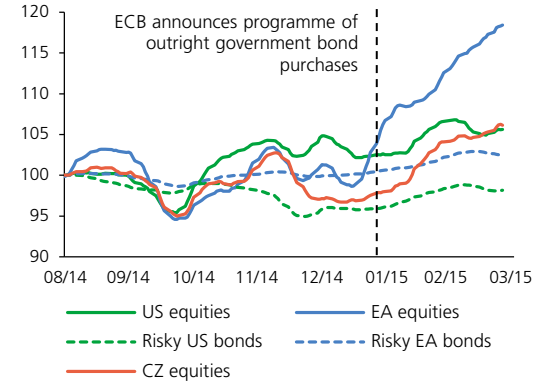
Actual and expected 10Y government bond yields of selected countries
(%)



Source: Bloomberg L.P.
Note: Quarter-end figures. The dashed lines indicate figures based on analysts' consensus forecasts as of 21 April 2015.

CHART II.6

Stock indices and risky corporate bonds
(1 September 2014 = 100)

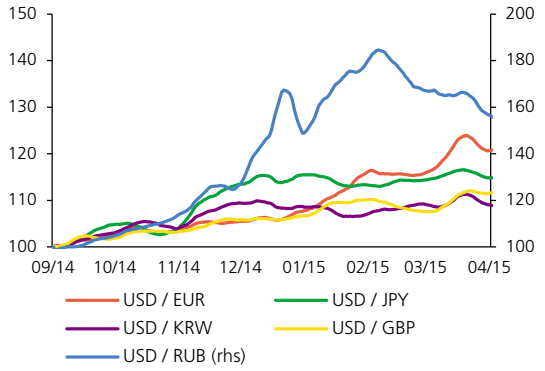


Source: Bloomberg L.P.
Note: Stock indeces – SP500 (USA), Euro STOXX 50 (EA) and PX (CZ). Risky bonds – rated BB+ or lower, denominated in USD or EUR. Indices include dividends and coupons as well as prices and thus represent the investor's total return. Index is smoothed by the 10-day moving average.

2 The ECB intends to purchase assets of EUR 60 billion per month under these three programmes.
3 In January, the Swiss National Bank abandoned its exchange rate commitment of CHF 1.20 per euro and let the franc appreciate beyond this level.
4 The QE transmission mechanism has two channels on the general level. The reduction in risk-free interest rates caused by government bond purchases is reflected in lower financing costs across sectors. In addition, investors switch from government bonds to riskier private sector assets. This causes the prices of those assets to rise and the yield spreads on credit markets to fall.
5 Pension management companies operating defined benefit pension plans face a risk of insufficient yields. This form does not occur in the Czech Republic.
6 IMF (2015): *Global Financial Stability Report*, April 2015, Chapter 1.

CHART II.7

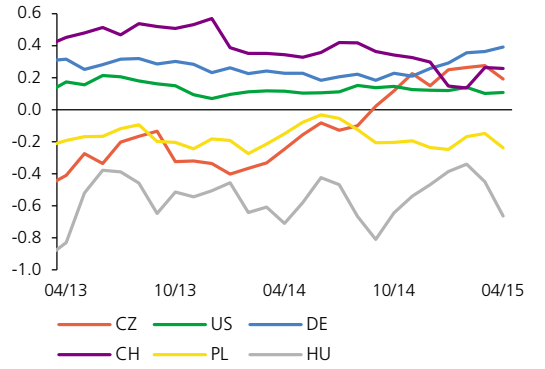
Nominal exchange rate indices
(1 September 2014 = 100)



Source: Thomson Reuters
Note: Indices are smoothed by the 10-day moving average. Growth in the index indicates currency appreciation.

CHART II.8

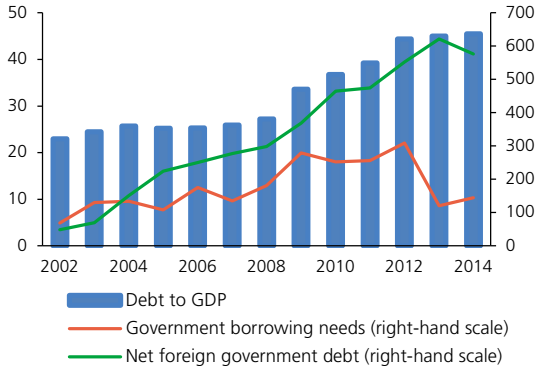
Difference between long-term money market rates and long-term government bond yields
(pp)



Source: Bloomberg L.P.
Note: Government bonds and interest rate swaps denominated in the currency of the relevant country with ten-year maturity; monthly averages.

CHART II.9

Government debt indicators
(% on left-hand scale; CZK billions on right-hand scale)



Source: CZSO, CNB, MF CR
Note: Borrowing needs are gross of repayments of T-bills.

… and contributing to increased exchange rate volatility

The first quarter of 2015 saw a sharp depreciation of the euro against major world currencies, due in part to rising uncertainty about political developments in Greece. In addition, a revision of expected yields by cross-border investors could lead to a reversal of cross-border capital flows and to other large exchange rate swings (see Chart II.7). Holders of foreign currency assets would be exposed to losses due to a fall in the value of their assets. In addition, debtors with foreign currency issues could face significant exchange rate risk. Sudden exchange rate fluctuations could also have an adverse effect on exporters' and importers' performance.

Central banks' announcements could have significant effects

Bond yield and exchange rate volatility could arise as a result of central bank communications about the start of monetary policy normalisation. So far, only the Fed has announced its intention to tighten monetary policy.[7] This announcement was one of the factors behind the marked appreciation of the dollar, which – combined with a higher level of dollar yields compared to yields on European currencies (see Chart II.3) – made US government bonds more attractive. The evolution of the dollar yield curve at its longer end suggests that market participants do not foresee any radical changes in US monetary policy given the fragile economic growth and low inflationary pressures. No sudden turnaround is expected for the ECB either, mainly because of persisting deflationary pressures in the euro area.

A sharp decline in yields is also apparent for Czech government bonds…

The ECB's purchases of high-quality assets of euro area countries and investors' access to cheap euro liquidity have also led to greater interest in Czech government bonds. Their yields fell to new lows in the first few months of this year (see Chart II.5), reaching the levels of those on German, Swiss and US government bonds, which investors regard as safe havens. This is also illustrated by the fact that the yield on the long-term koruna bond dropped below the long-term koruna money market rate (see Chart II.8). The relatively low level of Czech government debt and slower debt growth are playing an important role in this (see Chart II.9). Portfolio investors' interest may also have been fostered by favourable trends in the Czech Republic's total external debt indicators, such as a fall in the external debt / external assets ratio (see line MP.6 in the *Table of Indicators*).

… which are potentially exposed to increased volatility

The exceptionally low yields on domestic government bonds are also becoming a source of vulnerability for the Czech financial sector, given the low market liquidity of such bonds. Changes in global or domestic monetary conditions or fluctuations in foreign markets may give rise to higher volatility in the prices of Czech bonds. This would have a negative

7 CNB (2014): *Global Economic Outlook*, November 2014.

effect on domestic financial institutions, which hold most of these bonds. However, the intensity of the impact on financial institutions' balance sheets depends to a large extent on the size of the revalued portfolio, the volume and price of sales, the amount of bonds used as collateral in repo operations in the event of realisation of collateral, and the level of hedging against interest rate risk (see section 3.1). The CNB therefore conducts stress tests of the sensitivity of domestic financial institutions to liquidity and market risk (see sections 3.2 and 3.1).

The appropriate response is to extend the maturity of government debt

Increased price volatility on government bond markets, amplified by the low market liquidity of such instruments, could have an adverse effect on the refinancing of government debt. This risk applies primarily to debt with shorter maturity.[8] In managing their rising government debt, some countries are therefore taking advantage of the overall easy monetary and financial conditions to extend the average maturity of their debt (see Chart II.10). In so doing, they are preventively reducing their future annual gross borrowing needs and thereby dampening market volatility. Given the favourable market conditions and the high share of non-residents in domestic government debt[9] relative to domestic absorption capacity, extending the average maturity would also help mitigate systemic risks.

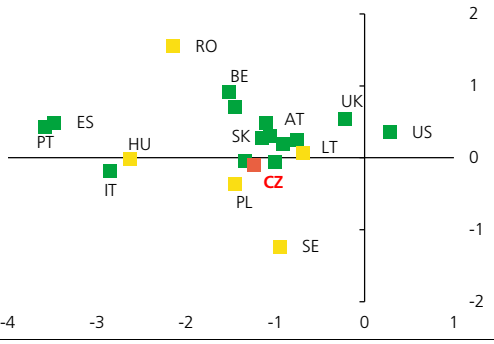
The deflationary pressures in the euro area are being amplified by subdued lending

The ECB's very accommodative monetary policy started to be reflected in a gradual recovery in euro area lending during 2014. A long period of tightening of credit standards was followed by a gradual easing via a decline in interest margins. Growth in non-financial corporations' and households' demand was renewed and is expected to rise further. The availability of loans in some euro area periphery countries remains poor, which is undermining activity and investment, especially in small and medium-sized enterprises. The stock of loans in the private sector is continuing to shrink in these countries (see Chart II.11) despite a significant drop in interest rates on new loans. So, the desirable process of deleveraging (a fall in the debt-to-income ratio) is gaining momentum. However, it is simultaneously exacerbating the disinflationary or deflationary pressures.[10] Given the high indebtedness of the private sector in euro area countries, no major increase in lending is likely for the time being.

8 The risk to future refinancing perceived by present investors increases in direct proportion to the amount of debt to be refinanced in the given year. This may give rise to a decrease in investors' current interest in participating in refinancing.
9 The share of non-residents in the total Czech public debt was approximately 22% (CZK 406 billion) at the end of 2014. The average monthly market turnover of government bonds was CZK 74 billion last year.
10 Growth in loans is the main component of money supply growth, which is the driving factor of inflation in the long run.

CHART II.10

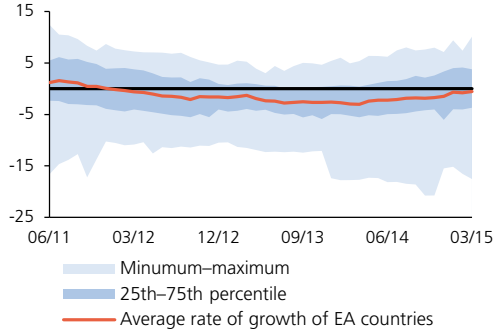
Public debt versus financing costs
(x-axis: change in yields in pp; y-axis: change in maturity in years)



Source: ECB, Bloomberg L.P.
Note: Changes in 10Y yields and average maturities between 3/2013 and 12/2014. To make the Chart easier to read, the legends for DE, DK, FI, FR, GR and NL have been left out. Yellow colour indicates shorter average maturity and green colour longer average maturity than in CZ.

CHART II.11

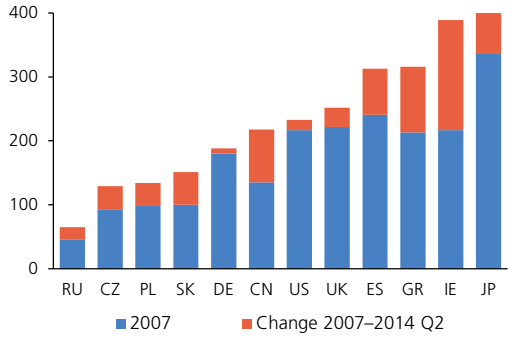
Rate of growth in loans to the private sector in euro area countries
(year-on-year change in %)



Source: ECB
Note: Private sector comprises households and non-financial corporations.

CHART II.12

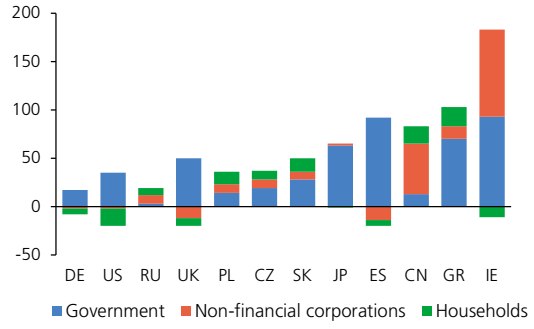
Ratio of private and government sector debt to GDP in international comparison
(% of GDP)



Source: CNB, McKinsey Global Institute
Note: Private sector debt is the sum of household debt and non-financial corporations' debt.

CHART II.13

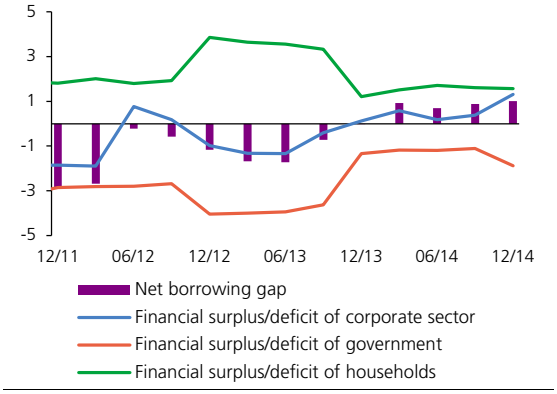
Change in the debt of selected economies between 2007 and 2014
(% of GDP)



Source: CNB, McKinsey Global Institute
Note: Data for 2014 Q2.

CHART II.14

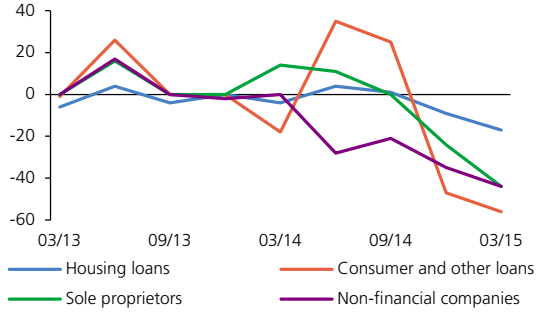
Financial surpluses/deficits by sector and the net borrowing gap
(annual moving totals as a ratio to GDP; %)



Source: CZSO, CNB
Note: The gap is calculated as the difference between the surpluses of the private sector (the corporate and household sectors) and the deficit of general government. The corporate sector comprises financial institutions and non-financial corporations. The household sector also includes non-profit institutions serving households.

CHART II.15

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



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

High indebtedness is undermining the effectiveness of monetary policy and hindering a more robust economic recovery

The total level of private and public sector debt in many countries has increased by more than half since the start of the financial crisis (see Chart II.12). Partial deleveraging of the private sector has occurred in some countries, thanks either to economic recovery (the USA and partly also the UK) or banking sector restructuring (Ireland and Spain). Even in these countries, however, the level of public debt has increased (see Chart II.13). The high indebtedness of the private and public sector in the euro area could undermine the effectiveness of the ECB's accommodative monetary policy. Quantitative easing may not be sufficient to deliver a robust economic recovery and eliminate deflation expectations.[11] Highly indebted corporations and households may prefer to repay their debts and reduce their debt servicing burden despite the low interest rates. This could have an adverse effect on private demand and create pressures for an opposite reaction in public expenditure and monetary policy. Governments and central banks will thus be forced to seek a compromise between deleveraging on the one hand and economic activity and employment on the other.

The domestic economic recovery faces heightened risks stemming from the external environment

Besides a modest pick-up in economic growth in the Czech Republic's main trading partner countries, the domestic economic recovery was aided by a weaker koruna, which, together with interest rate cuts, led to a substantial easing of the real monetary conditions.[12] The pass-through of the weakened exchange rate of the koruna to inflation via import prices is fading, but the easy monetary conditions are still contributing to continued growth in economic activity and a recovery in the labour market. The fragility of the recovery in the euro area and in other advanced countries, weakening growth in many emerging economies and adverse developments in Russia and Ukraine remain risks to Czech economic growth.

Some signs of a balance-sheet recession in the domestic economy persist

In 2014, a positive net borrowing gap[13] started to form in the Czech economy, indicating an increase in the risk of a balance-sheet recession (see Chart II.14). The private sector creates financial surpluses, which are not necessarily "spent" in full via a government sector deficit. A persistent presence of "free" funds in the private sector is usually associated with pessimistic expectations regarding future revenues and expenditures. However, the risk of a balance-sheet recession can currently be assessed as modest given the domestic economic recovery, the decline in the household saving rate and the expected evolution of Czech public finance.

11 IMF (2015): *Global Financial Stability Report*, April 2015, Chapter 1.
12 CNB (2015): *Inflation Report II/2015*, Box 3.
13 The net borrowing gap is the difference between the surpluses of the private sector and the general government deficit.

Economic growth is accompanied by a gradual recovery in lending in the Czech economy

The rate of growth of bank loans to the private sector is starting to recover gradually. Growth in corporate loans increased (see section 2.2) amid stable growth in loans to households (see section 2.3). According to the bank lending survey[14] the pick-up in lending in 2015 may have been fostered by an easing of credit standards and an increase in demand for loans in all market segments (see Chart II.15). Banks have sufficient funds thanks also to steady growth in deposits (see Chart II.16). Credit market developments will thus support domestic demand and will be one of the factors behind a further pick-up in GDP growth.

Alternative economic scenarios

Alternative economic scenarios were defined on the basis of potential alternative future macroeconomic trends along with the risks identified. These scenarios are used mainly in section 3.2 to test the resilience of the Czech financial sector. The paths of key variables in each scenario are shown in Charts II.17A–17D.[15] The evolution of other variables relevant to the stress tests in relation to the evolution of the macroeconomic environment (credit growth, the default rate, the NPL ratio[16] and property prices) is presented in the following sections.

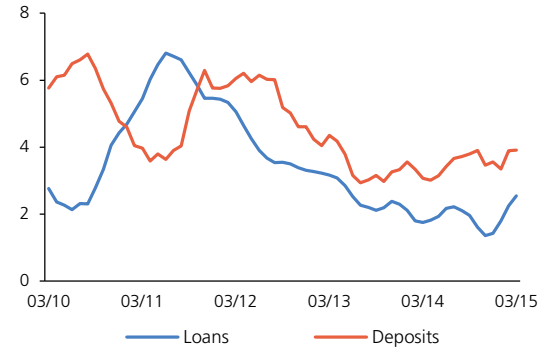
The ***Baseline Scenario*** is based on the CNB's official May macroeconomic forecast published in Inflation Report II/2015 and assumes an increase in economic activity of 2.6% this year due to growth in both domestic and external demand and to the overall environment of easy monetary conditions. In 2016 the economy is expected to return to relatively robust growth of 3.2%. The general unemployment rate falls below 5% as economic activity gathers pace. Headline inflation will increase from its low levels this year and reach the inflation target of 2% in early 2017. Consistent with the forecast is stability of market interest rates, followed by a gradual rise in rates as from the start of 2017. The koruna exchange rate will continue to be used as an instrument for easing the monetary conditions during 2015 and 2016.

The ***Adverse Scenario*** assumes an end to the brief recovery in the euro area and a marked drop in economic activity in Europe. This may be caused, for example, by problems in reaching agreement on economic and monetary policy measures in the euro area, negative expectations about developments in the global economy and a renewed increase in investors' risk aversion with regard to the EU and emerging economies. The Czech economy falls back into recession owing to a decrease in external demand. This will lead to a return of the private sector's

14 CNB (2015): *Bank Lending Survey*, April 2015.
15 The path for the *Baseline Scenario* in the first two years is based on the CNB's official prediction of May 2015. Beyond this horizon it is extrapolated towards the expected long-term equilibrium values. The *Adverse Scenario* assumes a larger cumulative contraction in economic activity at the test horizon than the stress scenario in last year's FSR 2013/2014.
16 The default rate and the NPL ratio relate to an identical event, i.e. a breakdown in a debtor's payment discipline. Whereas the default rate is a (usually forward-looking) flow indicator focused on a particular time interval (see the *Glossary*), the NPL ratio is a stock indicator describing the level of NPLs at a given point in time.

CHART II.16

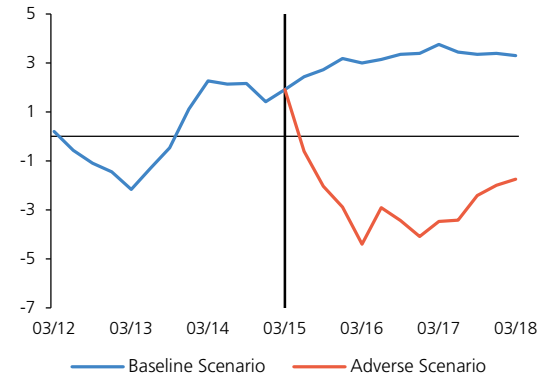
Rate of growth of bank loans and private sector deposits
(year-on-year change in %)



Source: CNB
Note: Annual rates of growth are smoothed by the 3-month moving average. The private sector comprises households, non-profit institutions serving households and non-financial corporations.

CHART II.17A

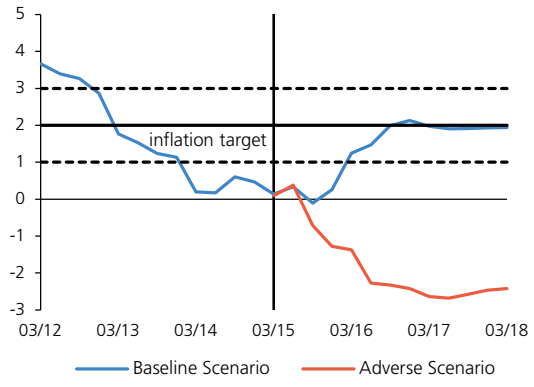
Alternative scenarios: real GDP growth
(year-on-year change in %)



Source: CNB

CHART II.17B

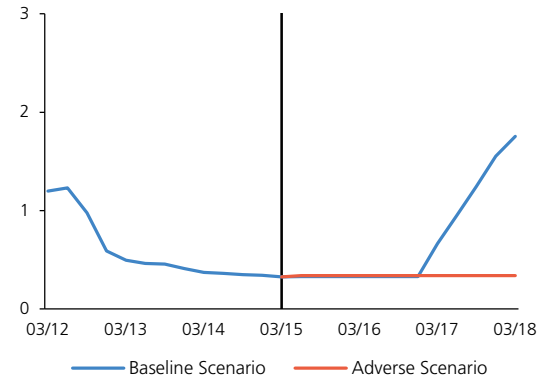
Alternative scenarios: inflation
(%)



Source: CNB

CHART II.17C

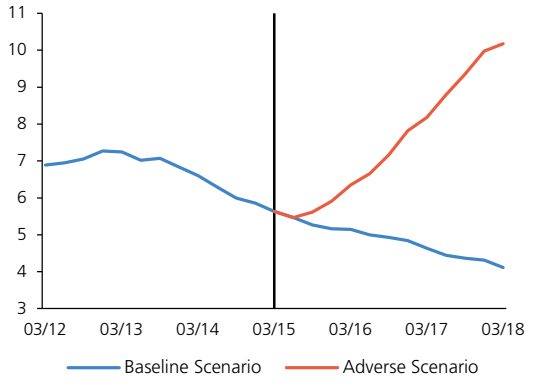
Alternative scenarios: 3M PRIBOR
(%)



Source: CNB

CHART II.17D

Alternative scenarios: unemployment
(%)



Source: CNB

pessimistic expectations about future economic developments and to renewed deferral of household consumption and corporate investment. The combination of a downturn in external demand and then also in domestic demand will cause a sizeable decline in economic activity in the Czech Republic over the entire three-year horizon and result in an "L-shaped" recession. In addition, the debt deflation scenario will materialise, with price deflation leading to an increase in private sector debt in real terms as a result of declining economic activity, rising unemployment and falling wages. The adverse economic situation will cause the funds of households and non-financial corporations gradually to become exhausted. Coupled with a rise in real debt, this causes a significant deterioration in their ability to repay. The problems in the real sector later also affect the financial sector, which records considerable credit losses and a marked decline in operating profits. Monetary policy remains easy, the three-month PRIBOR stays very low over the entire test horizon and the exchange rate weakens. However, long-term bond yields surge as global risk aversion increases and the safety of some assets is re-assessed. At the same time, banks revise their view of credit risk and increase their risk mark-ups on interest rates on new loans, which will shift to a much higher level, due also to an increase in long-term interest rates. The related rise in debt service together with other impacts of the recession will increase the default rate on loans to households and loans to non-financial corporations.

2.2 NON-FINANCIAL CORPORATIONS

The non-financial corporations sector as a whole recorded a substantial rise in performance and profitability thanks to the economic recovery. However, the financial situation across the sector shows sizeable differences in terms both of industry and company size. The conditions remain unfavourable for small corporations in particular. As regards industries, the energy segment recorded a further deterioration. Credit risk decreased overall, but remains elevated in the segments that were hit hardest by the recent recession. A decline in credit risk is generally being fostered by the low interest rate environment and higher profit generation, which is making it possible to create funds to service debts more easily. The sector's total debt remained flat despite the existence of cheap financing. In particular, growth in bank loans remains low. The main risk scenario for the non-financial corporations sector involves unfavourable developments in the Czech Republic's trading partner countries and a loss of confidence in the domestic economy leading to a fall in domestic demand.

The economic recovery is passing through to the sector's financial results

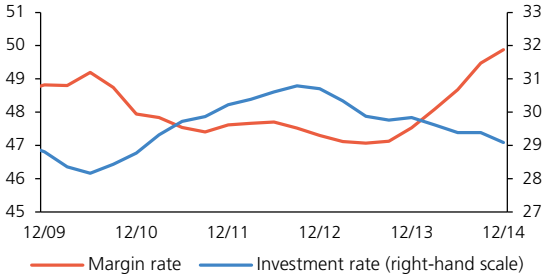
The economic recovery, which started in 2013 Q4, changed the financial situation of most non-financial corporations in 2014. The sector's margin rate rose appreciably in 2014 (see Chart II.18) and a fall in financial stress is also evidenced by a sizeable decline in the number of loss-making corporations (see Chart II.19). The sector's improving results were accompanied by renewed investment activity, although investment still grew at a rather slower pace than the sector's gross value added (see Chart II.18). Despite the positive developments seen in 2014, adverse tendencies persist in part of the sector. The available granular data indicate that the improvement so far pertains mainly to large companies and firms that were already posting relatively good results in previous years. Despite recording some improvement, the small enterprises segment is failing to achieve satisfactory results and is still exposed to elevated financial stress (see Chart II.19). Small enterprises will therefore probably be able to generate enough profit only if economic growth remains robust in the longer run and continues to be underpinned by growth in domestic demand.

The nature of the main risks faced by the sector remains unchanged

A renewed decline in aggregate demand, an increase in deflationary pressures and a return of the economy to recession remains the main risk scenario for the non-financial corporations sector. Given that the growth in economic activity over the last few quarters has been driven largely by export-oriented industries, adverse developments in the Czech Republic's key trading partner countries can be seen as the main potential source of risk. Its potential materialisation would probably be reflected in considerable shortfalls in external demand. The likelihood of this scenario is reduced to some extent by the QE measures recently adopted by the ECB. The observed improvement in domestic consumer and investment sentiment, which is mitigating the risks, is also an important positive aggregate demand factor. By contrast, increasing geopolitical risks

CHART II.18

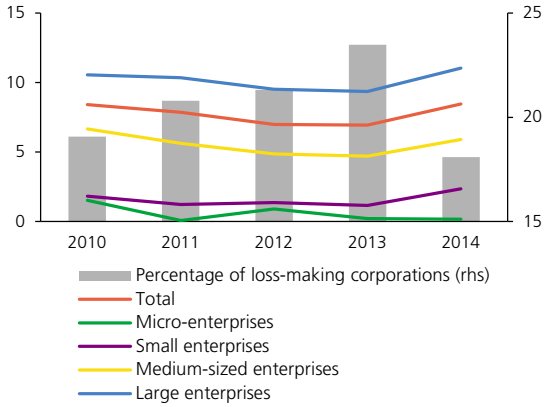
Margin rate and investment rate
(as % of gross value added of sector; calculated from annual moving totals)



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

CHART II.19

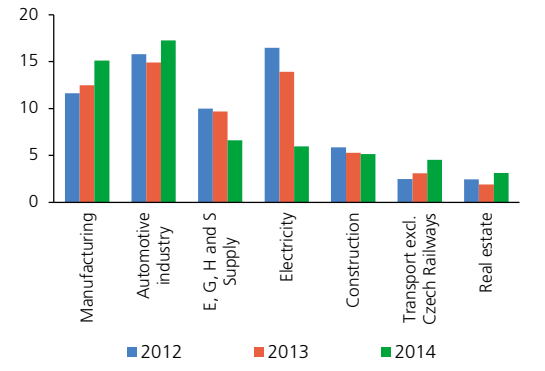
After-tax RoE by enterprise size and percentage of loss-making corporations
(%)



Source: CZSO, CNB calculation
Note: The results are based on a sample of corporations. The sample contains around 1,800 corporations together accounting for more than 50% of the sector's gross value added.

CHART II.20

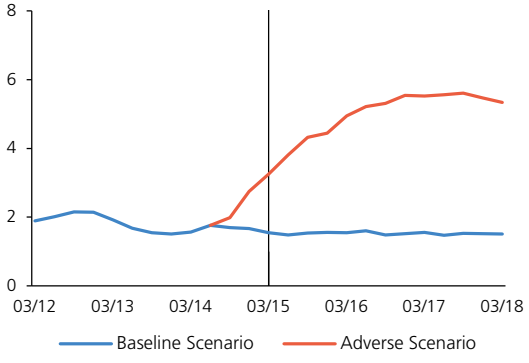
After-tax RoE in selected branches of activity
(%)



Source: CZSO, CNB
Note: E, G, H and S are electricity, gas, heat and sewerage. The sample contains around 1,800 corporations together accounting for more than 50% of the sector's gross value added. The automotive industry contains companies in NACE 29.

CHART II.21

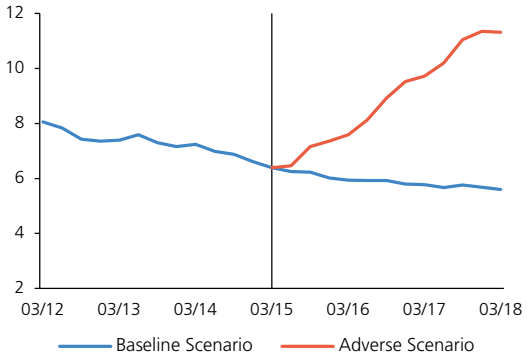
12-month default rate on bank loans to non-financial corporations
(%)



Source: CNB

CHART II.22

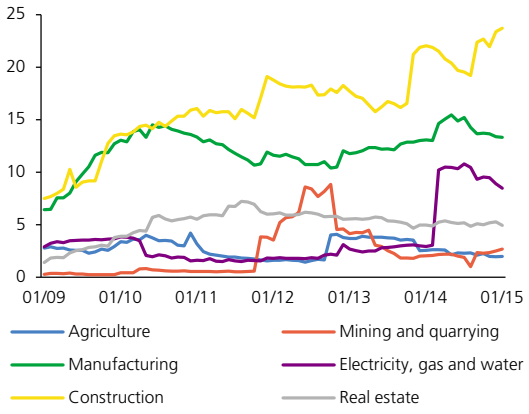
NPL ratio for bank loans in the non-financial corporations sector
(%)



Source: CNB

CHART II.23

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



Source: CNB

associated with the Russia-Ukraine conflict are acting in the opposite direction. Although the share of direct exports to these countries is relatively low, some firms have large exposures to these markets. Moreover, the conflict may have an even bigger impact on the domestic economy via a decline in exports from other EU countries to Russia if, as a result, trading partners reduce their imports from the Czech Republic.[17]

There were positive signals even from the hardest-hit industries in 2014

The sector's overall performance was driven by the manufacture of transport equipment. The recovery in demand in this industry spread gradually (not only via subcontracting channels) to other manufacturing industries in 2014. The rise in demand was reflected in an increase in margins on sales and subsequently in higher profitability of manufacturing as a whole (see Chart II.20). A major turnabout was also recorded by industries previously hit hardest by the recession, i.e. construction and services (especially transport and storage). Following a long period of decline, construction recorded annual growth in production of 4.3% in 2014. The rebound was due mainly to a rise in civil engineering output, driven by renewed construction of large infrastructure projects. New construction was launched thanks mainly to the resumption of public contracts.[18]

Despite the positive developments in most industries, the situation in energy, electricity supply and coal mining remains unfavourable. This is linked with the insufficiently effective European energy strategy and with low energy prices, whose level is generating competitiveness problems for this industry on the global scale. The situation is being exacerbated by geopolitical risks. Mild winters are hampering profitability as well. The materialisation of these (usually supra-national) risks is increasingly affecting Czech firms, and the decline in this industry's profitability may thus be long-term in nature.

Credit risk decreased overall…

Credit risk, as measured by the 12-month default rate, recorded a slight decrease as expected in 2014 (see Chart II.21). The share of non-performing loans (NPLs) in total loans showed a similar trend, falling by 1 pp from 7.4% in 2013 to 6.4% (see Chart II.22).[19] A decrease in credit risk is also suggested by other supplementary indicators, such as a decline in the number of petitions for insolvency proceedings and a fall in the number of bankruptcies. If the present recovery proved to be only temporary and the *Adverse Scenario* were to materialise, credit risk would rise sharply. The 12-month default rate would rise significantly at the four-year horizon (see Chart II.21). It would start falling again at the start of 2018, but the risk would remain elevated. A sharp increase in the

17 CNB (2014): Inflation Report IV/2014, Box 3.
18 However, the positive news from the construction industry must be evaluated with caution. The end-2014 CZSO data show that the approximate value of building notifications fell year on year in 2014 Q4.
19 Credit risk in the non-financial corporations sector is also analysed in the thematic article Use of the Czech Central Credit Register for Financial Stability Purposes published in this Report.

credit risk of non-financial corporations would also be reflected significantly in the NPL ratio (see Chart II.22), which would almost double from 6.4% to 11.3% over the three-year test horizon.

… but remains elevated in some industries…

The credit risk situation remains mixed across industries. Despite an improvement, construction shows an elevated level of credit risk, and exposures to manufacturing also remain quite risky (see Chart II.23). This can be partly explained by the structural nature of the two industries. Both construction and manufacturing are historically strongly procyclical industries in which credit risk rises more sharply during recessions than it does in other sectors (see Chart II.24). Moreover, the reaction of credit risk to the business cycle is not symmetrical in these industries – the risk falls more slowly during expansions than it rises during contractions. Sustained growth in economic activity is a prerequisite for a further decline in credit risk in these industries.

By contrast, a sharp rise in credit risk in the energy sector (see Chart II.23) points to growing problems in this segment and to the materialisation of risks that are evidently not cyclical in nature. The difference between average NPL ratios at times of expansion and recession is historically very low in the energy sector (see Chart II.24). This confirms concerns of a mismatch between the evolution of the cycle and the source of the current problems in the sector.

… and the situation in small enterprises is similarly unfavourable

Although a gradual decline in credit risk was observed for firms of all sizes in 2014, the credit risk of the smallest companies remains well above the level of the rest of the sector due to their worse financial situation (see Chart II.25). Large enterprises have been able to withstand the adverse situation in the long run and their credit risk has been falling since 2010 on average, whereas the smallest (micro) enterprises, along with sole proprietors, have been exposed to much greater financial stress. The difference in credit risk between large and small companies thus persists. The more pronounced recovery in domestic demand, which is having a major effect on the situation of local small firms, might change this negative trend.

The growth rate of bank loans is increasing only slowly despite the low interest rates and easier credit standards…

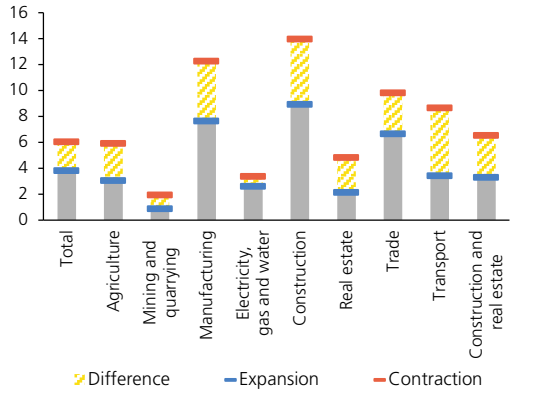
Bank loans to non-financial corporations are still recording low growth rates despite the fairly robust economic recovery. The current growth rate of bank loans is being affected mainly by factors on the credit demand side,[20] as there are signals of good credit availability on the supply side. This is evidenced by the fact that banks have significantly relaxed their credit standards for the corporate sector due to strong competition and the generally good liquidity situation (see Chart II.15).[21] According to the

20 Demand for bank loans may also be partly dampened by the rising amount of newly issued bonds (see below).

21 Good credit availability is also indicated by quarterly data from the business survey conducted by the CNB.

CHART II.24

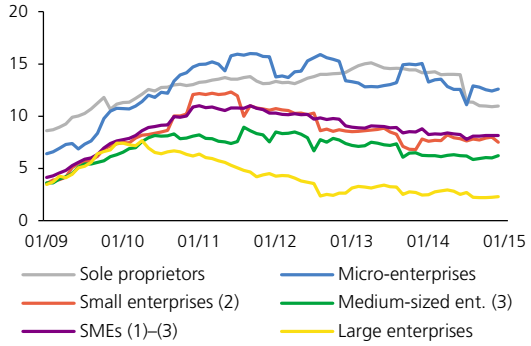
Average NPLs during economic expansions and contractions
(as % of total stock of bank loans in given category)



Source: CNB
Note: Expansion (contraction) is defined as an output gap higher (lower) than 1% (-1%). The HP filter was used to obtain the output gap over the period 2002–2014.

CHART II.25

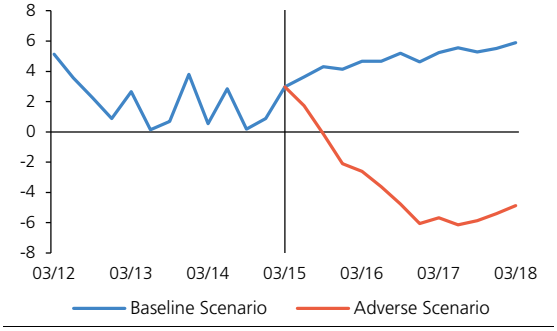
NPL ratios for bank loans by non-financial corporation size
(as % of given category)



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

CHART II.26

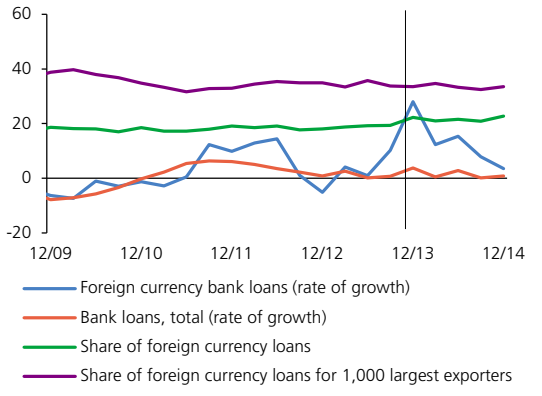
Year-on-year growth in bank loans to non-financial corporations
(%)



Source: CNB

CHART II.27

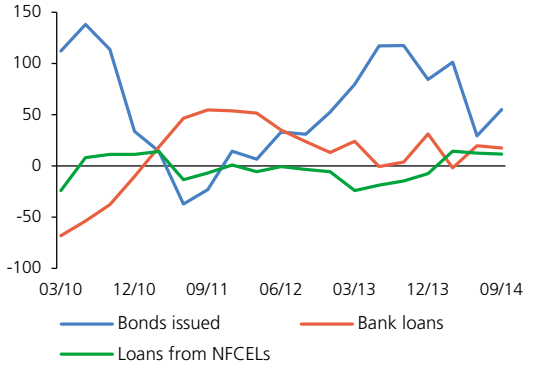
Year-on-year growth in foreign currency loans and their share in total bank loans
(%)



Source: CNB
Note: The pre- and post-intervention periods are separated by the vertical line. The set of 1,000 largest exporters pertains to 2014.

CHART II.28

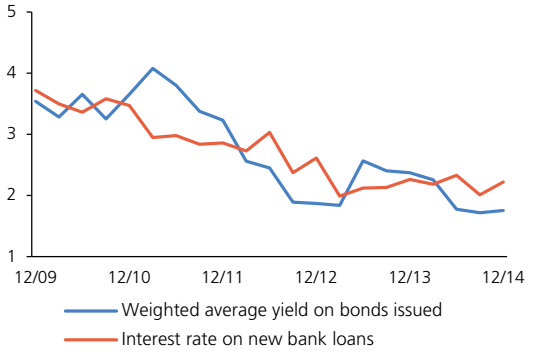
Dynamics of selected sources of financing of non-financial corporations
(year-on-year changes in CZK billions)



Source: CNB

CHART II.29

Interest rates and bond yields
(%)



Source: CNB, Bloomberg L.P.
Note: The bond yield represents the market rate on the secondary market.

Baseline Scenario, credit growth will rise gradually, although over the next few years it will not reach the pre-crisis levels and will still be modest compared to those levels (see Chart II.43). By contrast, should the *Adverse Scenario* materialise, the credit growth rate would only be positive in the middle of the first year. A substantial fall would be recorded at the three-year horizon and the credit cycle would return to its trough.

… and growth in foreign currency bank loans is continuing to fall

Given the use of the exchange rate commitment as an additional monetary policy instrument, it is desirable to monitor whether this measure is being translated into higher foreign currency financing among non-financial corporations. Such a tendency might signal, among other things, speculation by part of the sector on future appreciation of the Czech koruna. The available data indicate that the temporarily high growth rates of foreign currency bank loans observed to some extent before the CNB started intervening are gradually returning to their usual levels. Moreover, excluding price factors (the fixing of the exchange rate at its early November 2013 level) they are almost comparable with the growth rates of total corporate loans (see Chart II.27). The observed values thus do not indicate any major changes in the foreign currency financing behaviour of non-financial corporations and, except for the revaluation effect, no direct link can be identified between the foreign exchange interventions and subsequent developments.

Bond financing is outpacing bank lending…

Bond issuance remained elevated, especially in 2014 Q1. Its share in the financing of the sector has been rising in recent years (see Chart II.28). The issuance activity still pertains to quite a small set of large non-financial corporations, for which this source of financing is a cheap alternative to bank loans (see Chart II.29) and gives them access to larger amounts than individual Czech banks would be able to offer on their own. The Czech corporate bond market remains highly concentrated in terms of issuers, even though the number of bond issuers is increasing over time (see Chart II.30). The ten largest issuers account for around 90% of the total value of bonds issued by the sector.

… with primarily non-residents being exposed to bond credit risk

The credit risk associated with the issuance activity of Czech non-financial corporations affects the Czech financial sector only marginally and is borne mainly by non-residents, which hold around 75% of the total issuance.[22] Domestic financial institutions' holdings of Czech corporate bonds have long been below CZK 40 billion, which represents around 8% of the total issued. The high concentration of issuers in the energy sector, which has been showing declining performance in recent years and whose long-term outlook is currently not overly optimistic, may pose some risks (see above).

22 Although non-residents can be identified in more detail for only a small proportion of bond holdings, it can be concluded from the available sample that non-residents' holdings are divided among foreign banks and other financial intermediaries and, to a small extent, also include non-resident non-financial corporations.

The sector's total debt is flat and debt servicing is easier

Total debt was flat in 2014. Increased issuance activity and slight growth in bank loans was offset by a decline in inter-company loans and muted growth in other accounts payable (trade receivables, tax arrears, etc.). The risk of an excessive debt service burden decreased in 2014, mainly because of the sector's improved financial results creating new funds for repayments and also because of the continuously low financing costs (see Chart II.29). Total repayments of bank loans declined, amid a flat level of interest paid (see Chart II.31).

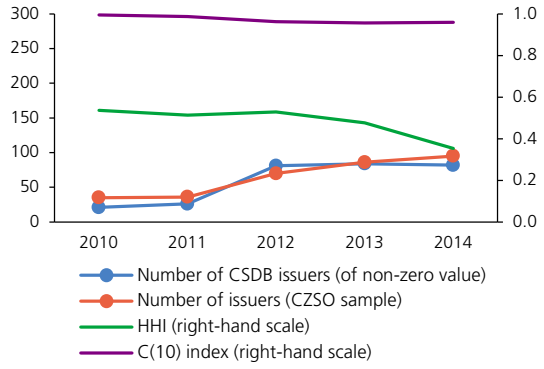
The sector's dependence on external developments is not decreasing

Despite the recovery in domestic demand, the share of exports in GDP rose to more than 84% at the end of 2014. On the one hand, exporters' good results – supported by the weaker exchange rate – are helping to reduce credit risk, which is well below the level of the sector as a whole (see Chart II.32), but on the other hand this is leading to a further increase in the sector's dependence on external economic growth. Given the geographical structure of exports, there is an ever-closer link to risks to economic growth in EU countries. As a result of the continuing crisis, exports to Russia and Ukraine also remain risky. This is further increased by the fact that exports of Czech goods to Russia started to fall by around 19% year on year on average[23] after the EU introduced a third round of sanctions against Russia in September 2014.[24] The sanctions might also put current investment projects at significant risk and lead to asset freezing and default on current trade receivables. The materialisation of related risks would have serious consequences for companies strongly oriented towards this region.

CHART II.30

Number of bond-issuing non-financial corporations and bond concentration

(number of legal entities; right-hand scale: index, minimum = 0, maximum = 1)

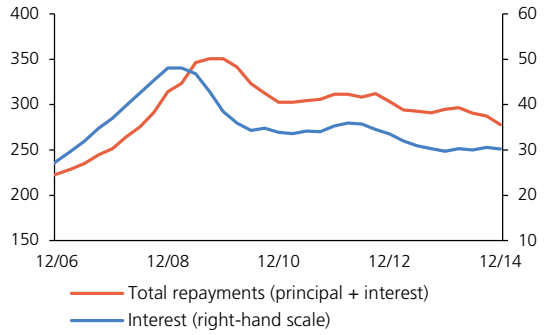


Source: ECB CSDB, CZSO
Note: The number of issuers based on CZSO sample data also contains companies that have issued bills of exchange. The C(10) index shows the share of the ten largest issuers in total bonds issued. The input data for HHI are the squares of the shares of individual issuers in total bonds issued. An index greater than 0.25 is generally regarded as a sign of very high concentration.

CHART II.31

Repayments of principal and interest on bank loans

(CZK billions; annual moving totals)

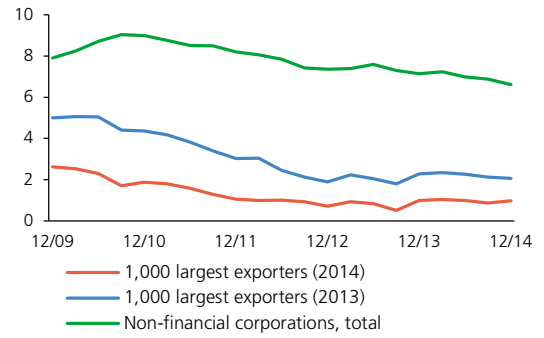


Source: CNB
Note: Total repayments are calculated on the basis of CCR data.

CHART II.32

Non-performing bank loans ratio for the 1,000 largest exporters

(%)



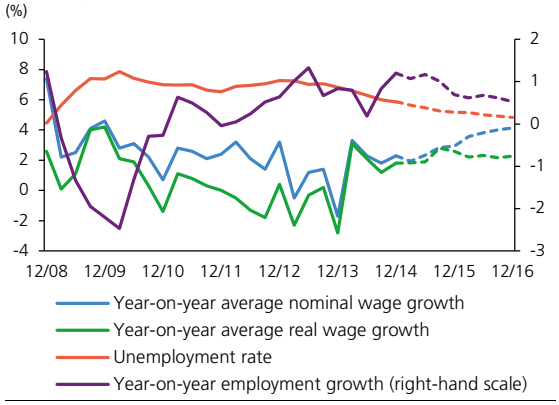
Source: CNB
Note: The structure of the 1,000 largest exporters changes over time, so for each series we give the year indicating the set of exporters to which the time series pertains.

23 The third round of sanctions against Russia adopted by the EU in September 2014 includes restrictions on arms trade, exports of dual-use goods and technology and exports of technology for the oil industry and related sectors (this applies only to new contracts, not to existing ones).

24 This figure is significantly affected by a 40% year-on-year decrease in goods exports in January. However, the decrease can be attributed to the general economic situation in Russia and not solely to "Western" countries' economic sanctions. In addition, demand in Russia was hit by a sharp depreciation of the rouble at the end of 2014.

CHART II.33

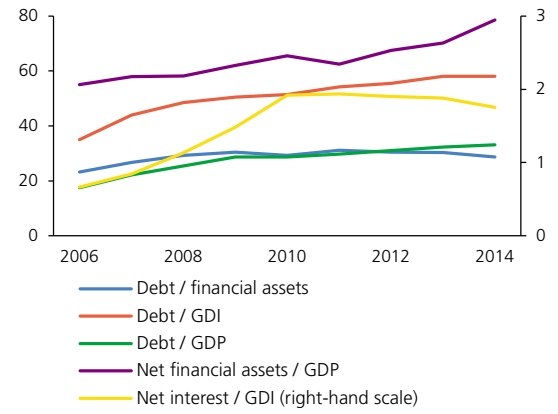
Nominal and real wage growth, employment growth and the unemployment rate



Source: CNB
Note: The unemployment rate is seasonally adjusted. Dashed lines indicate the CNB's May 2015 predictions.

CHART II.34

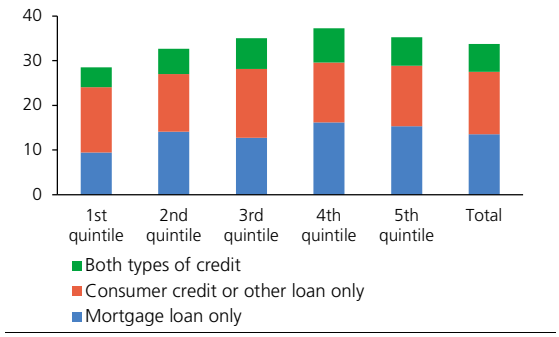
Household debt ratios



Source: CZSO, CNB
Note: The net interest payments data do not cover non-bank institutions.

CHART II.35

Shares of indebted households by income quintile



Source: 2013 Household Budget Statistics, CNB calculation
Note: The income quintiles are based on income per consumption unit for the full sample of households.

2.3 HOUSEHOLDS

The domestic economic recovery had a favourable effect on the labour market in 2014. Household income returned to growth and the unemployment rate declined. Gradual income growth accompanied by a slowdown in the year-on-year dynamics of the financial liabilities of households helped stabilise households' total debt. The interest burden on households fell to its lowest level in four years thanks to a fall in interest rates on mortgage loans and consumer credit. The sector's overall credit risk remained at a similar level as a year earlier, but the consumer credit segment is still considerably riskier than the segment of loans for house purchase. A sudden rise in interest rates on loans unaccompanied by a similar increase in income is still the main risk to the household sector. However, this risk is being dampened in part by an increasing average interest rate fixation period for new mortgage loans.

The income situation of households is gradually improving…

The economic recovery had a positive effect on the labour market in 2014. The general unemployment rate[25] fell by 0.8 pp year on year to 6.2% and the number of job vacancies more than doubled. However, wage dynamics remained subdued. The average nominal and real wage picked up by 2.4% and 2% respectively, making up for the real fall in wages recorded in 2013 (see Chart II.33). The outlooks for the next two years assume continuing growth in nominal and real wages and a further decline in the unemployment rate. The better income conditions were positively reflected in year-on-year growth in the gross nominal disposable income of households of 2.4%. This, together with renewed consumer confidence, led to an increase in households' nominal consumption expenditure of 2.0%.

… which is having a positive effect on their debt sustainability…

Total household debt relative to both gross disposable income (GDI) and real GDP stabilised in 2014 (see Chart II.34). As usual, higher-income households still have higher debt, but the difference is relatively small when households are divided according to income per consumption unit[26] (see Chart II.35). Low-income households mainly hold consumer credit, while mortgage loans prevail among high-income households. The two types of credit are held simultaneously mostly by households in higher income quintiles. This is a positive factor as regards debt sustainability. The debt of Czech households has long been substantially lower compared to the euro area, but the difference is gradually decreasing over time (see Chart II.36). Net interest payments on bank loans (net of interest received on deposits) fell for the third consecutive year. This was due to a drop in mortgage and consumer credit rates.

25 In the 15–64 age category. Measured by the ILO methodology according to the LFS.
26 Dividing households according to income per consumption unit allows households of different sizes and structures to be compared. A consumption unit is defined according to the OECD. A whole consumption unit is assigned only to the head of the household, while children aged up to 13 years have a weight of 0.5 and other persons a weight of 0.7.

… and is contributing to a stronger overall financial position of the average household

The relative wealth of households (expressed as the ratio of net financial assets to GDP) rose by 6.3% year on year owing to renewed income growth and slower growth in debt (see Chart II.34). The aggregated household balance sheet has also strengthened markedly since the onset of the crisis. Net worth, which currently makes up about 85% of all household liabilities, rose by 20% (see Chart II.37). More than one-half of financial assets are held in the form of cash or bank deposits, so households have a relatively high liquid "financial buffer" on average. In this respect, however, the situation is probably very heterogeneous across income groups. According to stress tests, the share of financially distressed households[27] is higher among low-income households. These households do not have a sufficient financial surplus and get into arrears.

Growth in loans to households was driven by bank loans for house purchase

The total amount of loans provided to households rose by around 4.5% year on year in 2014. This rise was driven by bank loans for house purchase, which went up by about 6%. By contrast, the amount of consumer credit provided by banks fell by almost 1%. The growth rate of loans to households provided by non-bank intermediaries was 2%. As a result of a gradual renewal of consumer confidence and a further drop in client interest rates, growth in loans to households can be expected to pick up pace in the next two years (see Chart II.38), as households are expected to show stronger interest in both loans for house purchase and consumer credit. Bank loans account for about 95% of total loans to households. The remaining 5% is provided by non-bank financial corporations engaged in lending, whose share in lending to households has long been falling (see Chart II.39).

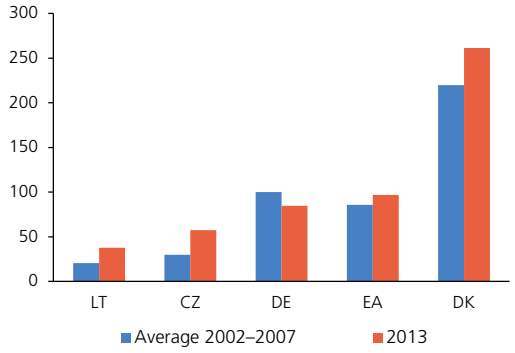
Banks started easing credit standards

Credit standards applied to loans to households started to be eased in late 2014 (see Chart II.15). Relaxed credit standards for loans for house purchase coupled with historically low interest rates and rising residential property prices could be a potential source of systemic risk. This is because households that do not have stable and sufficiently high income may decide to buy property on credit (influenced by optimistic information from the media and entities having a vested interest in selling, intermediating or financing). These households may be sensitive to a rise in interest rates unaccompanied by a similar increase in income. A sudden interest rate rise could lead to an increase in household distress, with a stronger impact on lower-income households, as indicated by simulations performed in household stress tests (see Chart II.40). An increase in financial distress due to default on mortgage loans would occur in about one-half of cases.

27 A household is considered to be financially distressed if it is unable to service its debts after covering the essential costs of living (see CNB Working Paper 2/2014 for details).

CHART II.36

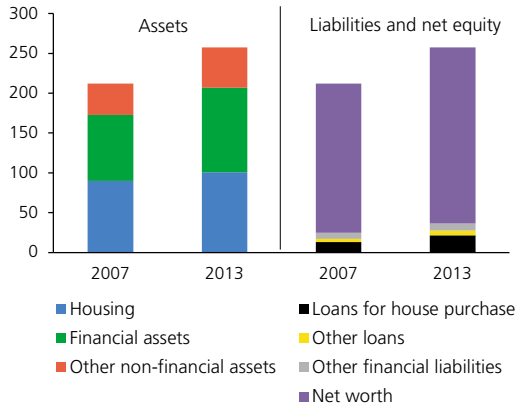
Debt-to-income ratio of households
(%)



Source: Eurostat
Note: LT has the lowest ratio in the euro area and DK the highest.

CHART II.37

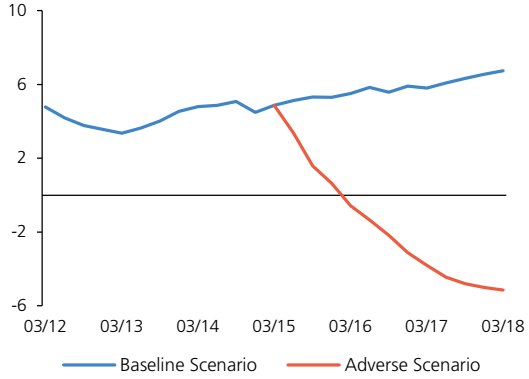
Balance sheet of households
(% of GDP)



Source CZSO, CNB

CHART II.38

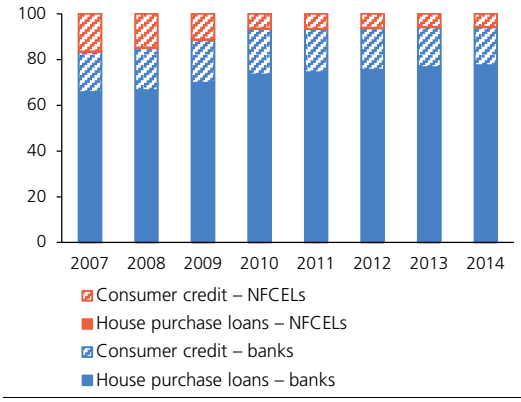
Year-on-year growth in bank loans to households
(%)



Source: CNB

CHART II.39

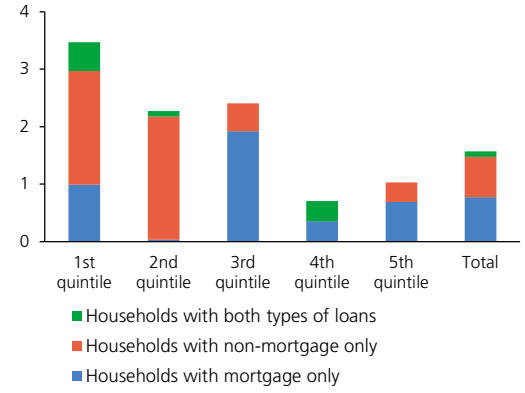
Loans to households
(shares in %)



Source: CNB

CHART II.40

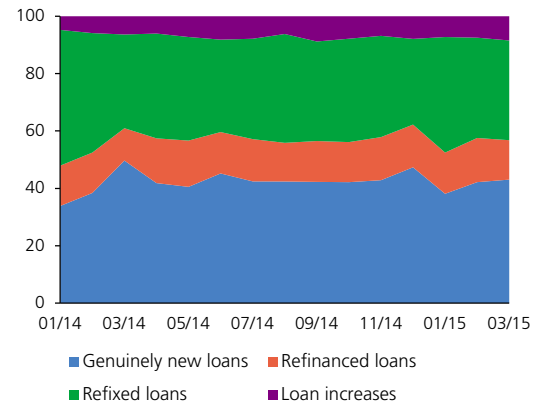
Simulation of growth in the percentage of financially distressed households in response to a 3 pp increase in interest rates
(pp)



Source: CNB

CHART II.1 BOX

New mortgage loans for residential property
(shares in %)



Source: CNB

BOX 1: HOW NEW ARE NEW MORTGAGE LOANS?

Mortgage loans fall within the broader category of loans for house purchase. Most loans for house purchase (around 70%) are genuinely mortgage loans for residential property secured by that property. However, they also include building society loans, consumer credit for property and loans for residential property for entrepreneurial purposes.

Monthly data on the amount of mortgage loans provided are one of the most closely observed indicators of mortgage lending. Since last year, new statistics allow the total amount of new mortgage loans to be adjusted for refixed and refinanced loans. With these types of loans, a new interest rate is negotiated only for the outstanding part of the loan, either with the debtor's original bank (refixation) or with another bank (refinancing). Therefore, they are not actually new loans representing a real increase in the banking sector's claims on households. Such an increase only occurs where the refixation or refinancing of a mortgage loan is associated with an increase in the amount of the loan.

Last year the share of refixed mortgage loans was just over 35%, the share of refinanced loans was almost 15% and the share of increases was around 7%. Therefore, only around 40% were genuinely new mortgages (see Chart II.1 Box). This confirms that the information value of earlier publicly cited data on the amounts of genuinely new mortgage loans not adjusted for refixed and refinanced loans was limited.

The dynamics and structure of new mortgage loans differ across bank types. In 2015 Q1, small banks increased the total amount of new mortgage loans (including refixed and refinanced loans) by more than 80%, large and medium-sized banks by less than 20% and building societies by 30%. In the case of small banks, refinanced loans were the biggest contributor to this increase, accounting for more than 50% of new mortgage loans (see Chart II.2 Box). In addition, small banks are pushing down the interest rate more than other types of banks (see Chart II.3 Box). This suggests that they are capable of using very favourable interest rates to persuade clients of other banks to refinance their mortgage loans with them.

Longer average interest rate fixation periods for new mortgage loans are making households less sensitive to interest rate movements

The average interest rate fixation period for new mortgage loans is gradually increasing (see Chart II.41). This is mainly due to rising demand from households, supported by banks, for loans with an interest rate fixation of over five years and up to ten years, which more than doubled

year on year.[28] Loans with this fixation also recorded the largest decrease in interest rates (see Chart II.42). A long-term decline in mortgage rates could foster higher household credit risk if accompanied by a disproportionate decrease in margins. On the other hand, longer rate fixation periods could reduce household credit risk. In the event of a sharp rise in rates, households with mortgage loans with longer fixations might thus not face an immediate shock.

Household credit risk is set to decline gradually in the years ahead

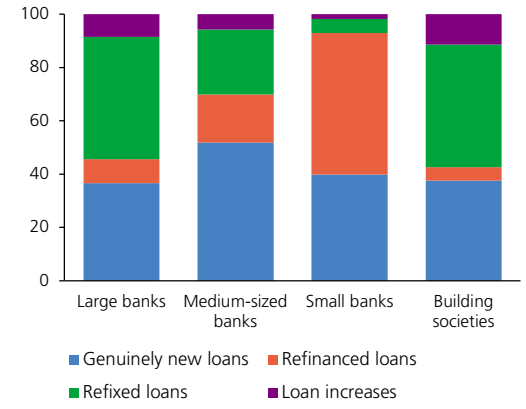
According to the 12-month default rate, household credit risk remained at a similar level as a year earlier in 2014 (see Chart II.43) for both loans for house purchase and consumer credit. The NPL ratio for bank loans was also little changed in 2014 (see Chart II.44). However, the values of the two indicators differ significantly across segments. The NPL ratio for loans for house purchase was around 3% in 2015 Q1, whereas that for consumer credit exceeded 12%.[29] Similar differences are also visible for the 12-month default rate. Outlooks expect a gradual decline in household credit risk over the next few years (see Charts II.43 and II.44).

Low-income households would be hit hardest by a return to recession

A weakening of economic activity, growth in unemployment and a drop in real wages would result in the 12-month default rate rising to 7.4% at the four-year horizon (see Chart II.43). In this scenario, the NPL ratio would also be significantly higher than in the *Baseline Scenario* (see Chart II.44). Low-income households, which have also long been considerably more financially distressed than the rest of the population, would react most sensitively to this. Were the risks of the stress scenario to materialise, the rate of distress among low-income households would exceed 17% (see Chart II.45). However, the impact of the stress scenario would be limited, as the share of low-income households in total bank loans is low.

CHART II.2 BOX

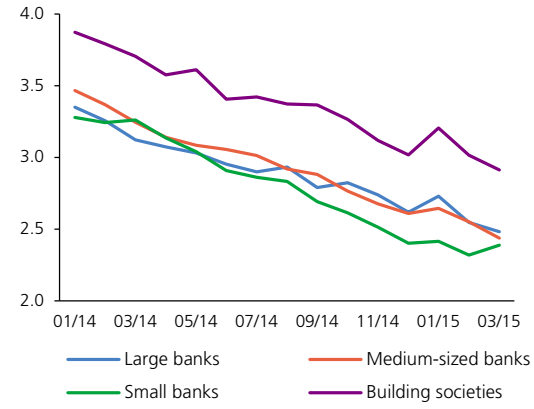
New mortgage loans by bank type
(shares in %)



Source: CNB

CHART II.3 BOX

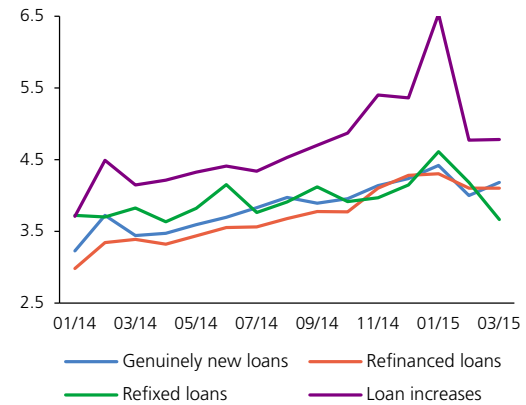
Interest rates on new mortgage loans by banks type
(%)



Source: CNB

CHART II.41

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

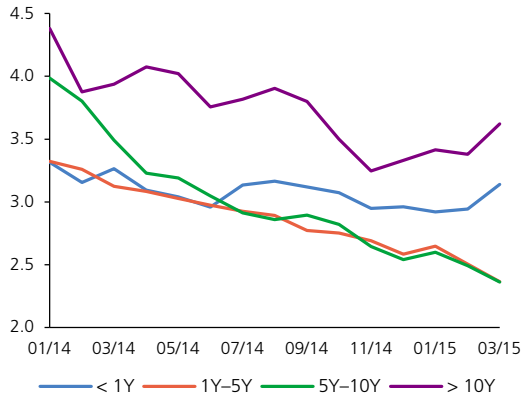


Source: CNB

28 Mortgages with fixations of over ten years are also becoming more popular, but they still account for a minority of total new mortgage loans.
29 These are preliminary estimates. The final values will become available in 2016 Q2.

CHART II.42

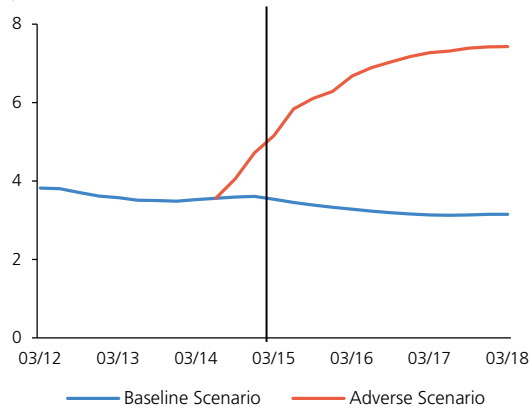
Interest rates on new mortgage loans for residential property
(%)



Source: CNB

CHART II.43

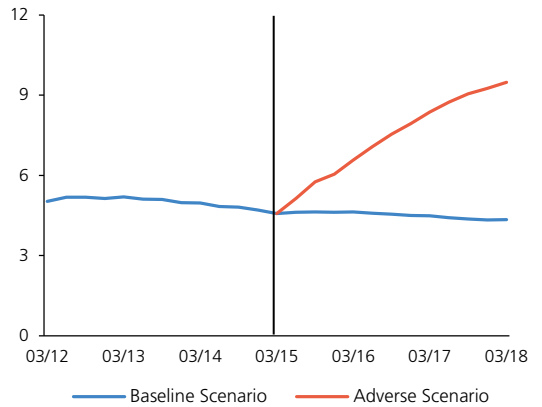
12-month default rate on bank loans to households
(%)



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

CHART II.44

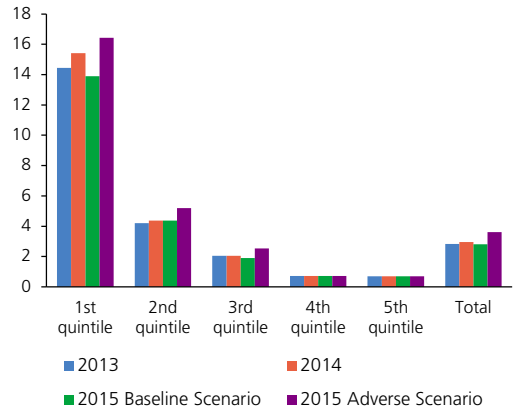
NPL ratio for bank loans in the household segment
(%)



Source: CNB

CHART II.45

Share of financially distressed households by income quintile
(%)



Source: Household Budget Statistics, CNB calculation
Note: The shares are given for households that have some sort of loan. However, the income quintiles are based on the full sample of households.

2.4 THE PROPERTY MARKET

Prices of residential property rose modestly in 2014, but the trends remain mixed across regions. Growth in residential property prices in Prague and the increasing profitability of buying apartments for investment purposes is generating potential for the emergence of a price spiral. Falling interest rates on loans for house purchase coupled with easier credit standards might contribute to this spiral. As regards commercial property, construction is on the rise and investment is also increasing, driven mainly by demand from abroad. New construction of office property is leading to a rise in the vacancy rate to relatively high levels. The NPL ratio among developers declined slightly and new loans to developers returned to growth. However, the volume of new loans is low, as the renewed development activity is being financed largely from developers' own funds or from abroad.

Residential property prices increased in 2014…

Transaction prices of residential property saw modest growth across the monitored categories in 2014 (see Chart II.46). Apartment prices in the Czech Republic as a whole were assessed as being slightly overvalued at the end of 2014 (for details, see section 4.2 and the thematic article *A Comprehensive Method for House Price Sustainability Assessment*).

… but trends differed across regions

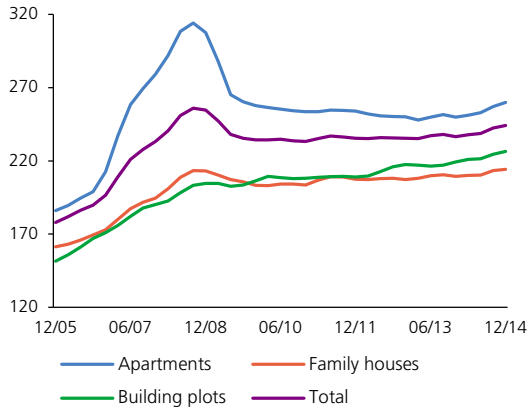
The available estimates of transaction prices in individual regions[30] show that their growth in the Czech Republic as a whole conceals significant regional differences. Prices are rising apace in some regions, but are still falling substantially in others. The largest divergence in 2014 was recorded for apartments (see Chart II.47). Asking prices in Prague continued to rise sharply for the third consecutive year. Furthermore, they accelerated again after having slowed in 2013. In the rest of the Czech Republic, by contrast, the signs of a recovery observed last year weakened and growth in asking prices outside Prague halted in 2014 Q4. According to estimates based on tax returns, transaction prices in Prague rose by 4.4% and 7.2% year on year respectively in 2014 Q1 and Q2.[31] Apartment prices in Prague were assessed as being overvalued by 4% at the end of 2014 (see section 4.2). According to estimates based on tax returns, however, transaction prices in the rest of the Czech Republic fell further in 2014 Q1 and Q2 (by 0.3% and 1.9% respectively).

Prices of family houses and building plots also increased

Transaction prices of family houses in Prague rose in 2014 H1 according to estimates based on tax returns. Like apartment prices, they were flat in the rest of the Czech Republic. Estimates of transaction prices, which are available only for the Czech Republic as a whole, indicate growth in prices of family houses of 1.8% year on year on average in 2014 H2. Estimates of transaction prices of building plots, also available only for

CHART II.46

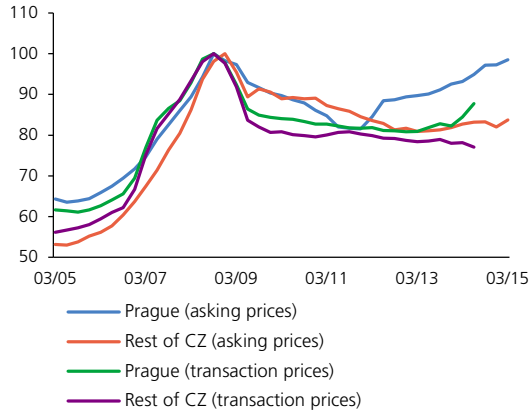
Property prices – transaction prices
(1999 Q1 = 100)



Source: CZSO, HB Index, CNB calculation
Note: The data for family houses and apartments for 2014 H1 are preliminary. The other data for 2014 are calculated from alternative sources of data on transaction prices (the HB index and transaction prices of apartments from a CZSO survey).

CHART II.47

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



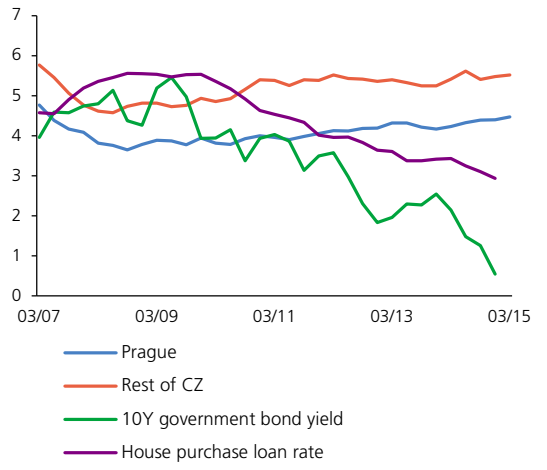
Source: CZSO

30 Estimates of transaction prices based on tax returns, which are also published broken down by region, are available up to 2014 Q2 for family houses and apartments and up to 2013 Q4 for land. The evolution of prices up to 2014 Q4 was calculated from price data obtained from a CZSO survey (apartments) and the HB index (family houses and apartments).

31 Transaction price estimates based on tax returns may be subject to significant revisions.

CHART II.48

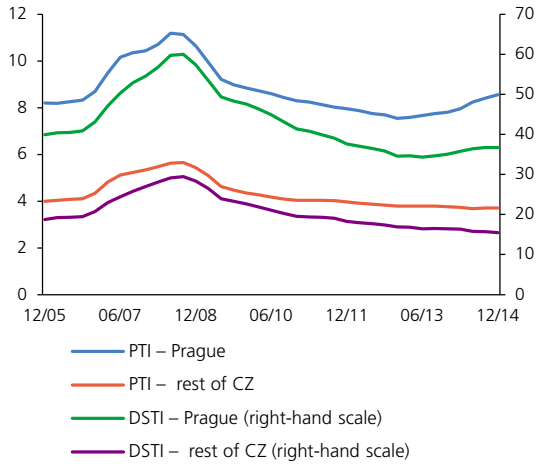
Apartment rental returns
(%)



Source: IRI, CNB
Note: Comparison with yields on a basket of government bonds with an average residual maturity of 10 years and rates on new house purchase loans.

CHART II.49

Housing affordability indicators
(% on right-hand scale)



Source: CZSO, CNB
Note: PTI (DSTI) is ratio of price of 68 m² apartment (monthly debt service) to moving sum of wage over last four quarters. PTI and DSTE are A mortgage with an LTV of 65% and a repayment period of 20 years was considered for the DSTI calculation. The data for 2014 are preliminary.

the Czech Republic as a whole for 2014, point to a rise of 2.7% year on year on average.

Rapid growth in asking prices of apartments in Prague…

The difference between asking prices and transaction prices of apartments in Prague persists. Transaction prices based on tax returns saw an increase of 8.9% in 2014 Q2 from their most recent trough, while asking prices were 16.4% higher in the same period.[32] The rapid growth in asking prices, followed by growth in transaction prices, may indicate the emergence of a price spiral driven by buyers' expectations of further price growth. In turn, developers may adjust their expectations to the dynamics of asking prices and accelerate the price spiral through increased construction. Were the increase in transaction prices to be out of line with economic fundamentals (e.g. wage growth), credit risk in the loans for house purchase sector would increase. On the other hand, if asking price developments were to prove overly optimistic and fail to be followed by transaction price growth, the level of risk would increase in the development sector.

… is increasing the incentive to buy apartments for both housing and investment purposes

As a result of growth in rents in Prague during 2014, the perceived attractiveness of buying an apartment as an investment, as measured by the ratio of annual rental income to the apartment price, rose further. Owing to a sharp decrease in government bond yields (of 2.0 pp on a basket of government bonds with an average residual maturity of 10 years), the profitability of buying to let relative to alternative investments also increased. The same trend was recorded in the rest of the Czech Republic (see Chart II.48). At the same time, apartment affordability, as expressed by the price-to-average wage ratio, declined by 9.6% in Prague in 2014 (see Chart II.49). This decline was due not only to growth in transaction prices, but also to sluggish wage growth. However, a further drop in interest rates on loans for house purchase of almost 0.5 pp occurred simultaneously. The affordability of credit-financed apartments in Prague, as measured by the debt service-to-average wage ratio, fell by just 5.0% and remains high owing to previous interest rate decreases.

Construction of new apartments is also rising in Prague

In 2014, the number of apartment starts in apartment blocks in Prague more than doubled from the low recorded in 2012, rising by 46.3% year on year (see Chart II.50). In the last two years, more apartments were started in Prague than in the rest of the Czech Republic as a whole for the first time since the onset of the previous price growth in 2005. This may be due in part to "lagged" property price movements in the rest of the Czech Republic, but to some extent it may also point to excessive apartment construction in Prague.

32 Part of this increase was probably due to a statistical anomaly in CZSO asking prices in Prague in 2012. In contrast to that episode, however, rapid growth in asking prices in Prague in 2014 was also indicated by an alternative data source (Institute for Regional Information).

Residential property prices will continue to trend up

The property market trend in the years ahead will depend mainly on macroeconomic developments. In line with the *Baseline Scenario*, relatively modest but accelerating growth in property prices can be expected in the future. Apartment prices may rise by 4% year on year in 2015, accelerating slightly to around 5% year on year in 2016 (see Chart II.51). However, easy monetary conditions worldwide and a related "search for yield" may pose a risk of significantly stronger property price growth than is consistent with the assumptions of the *Baseline Scenario*. On the other hand, the risks of significantly worse macroeconomic developments are illustrated as usual in the *Adverse Scenario*, which could lead to a decrease in apartment prices of as much as 20% in 2017.

New construction and investment activity is also rising on the commercial property market

Investment activity strengthened further in 2014, with total investment in commercial property rising by 47% year on year to EUR 2.04 billion.[33] This is the third-highest investment volume ever, standing 84% above the long-term average (see Chart II.52). The rise in investment activity was driven chiefly by demand from foreign investors, motivated by very low yields on alternative assets. Although yields on commercial property have fallen to 5.25%–7% since the end of 2013,[34] the yield on a basket of government bonds with an average residual maturity of 10 years was just 0.54% in the same period. Given the predicted course of ECB monetary policy (see section 2.1), increased investment in commercial property can be expected to continue. Further downward pressure on commercial property yields and upward pressure on commercial property prices may emerge. The stronger investment activity in the commercial property sector is also making the sector more sensitive to developments abroad, and especially to potential changes in foreign investor sentiment. The recovery in the investment segment of the market and the related recovery in new construction may not be in line with developments in the rental segment. The rental segment is more dependent on the domestic economy and may be adversely affected by the weaker exchange rate of the koruna (most contracts are in euro, while tenants' incomes are in koruna).

The market situation differs across types of commercial property

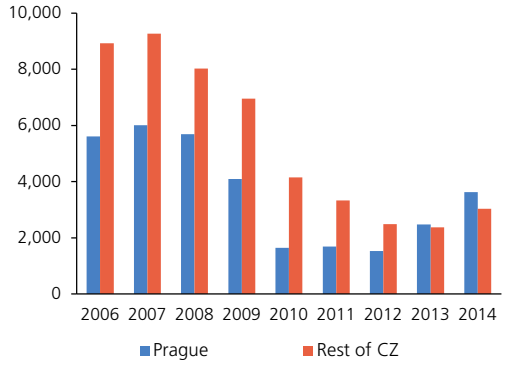
Developments in the rental segment differ substantially by type of commercial property. The situation is least favourable in the office property segment, where an increase in new construction (of 90% year on year) led to a rise in the vacancy rate of 2.2 pp year on year to 15.3% (see Chart II.53) despite a recovery in take-up (gross take-up increased by

33 Property investment covers both transactions in newly completed commercial property and transactions in property completed in the past. The investment segment of the market determines the price and prime yield on commercial property and thereby influences the new construction segment. The rental segment of the market determines rent and take-up. In combination with newly completed space, take-up determines the vacancy rate. For a more detailed description of the market see the thematic article *Office Property in Central European Countries* in FSR 2013/2014.

34 By comparison with the end of 2013, yields on commercial property fell by 1 pp to 5.25% in 2015 Q1, yields on industrial property dropped by 0.5 pp to 7% and yields on office property were flat at 6%. Government bond yields were only 0.3% in 2015 Q1.

CHART II.50

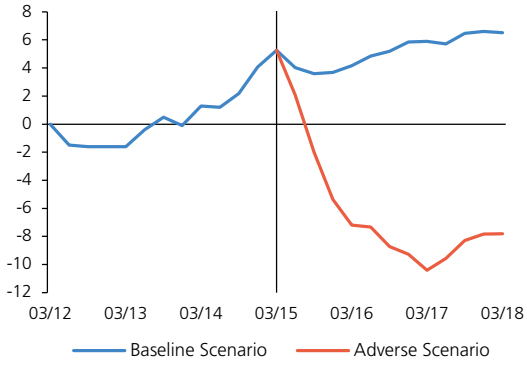
Numbers of apartment starts



Source: CNB, CZSO
Note: Numbers of apartment starts in apartment blocks only.

CHART II.51

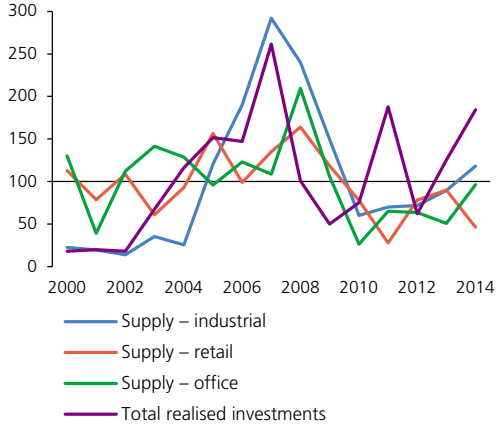
Year-on-year property price growth
(%)



Source: CZSO, CNB calculation

CHART II.52

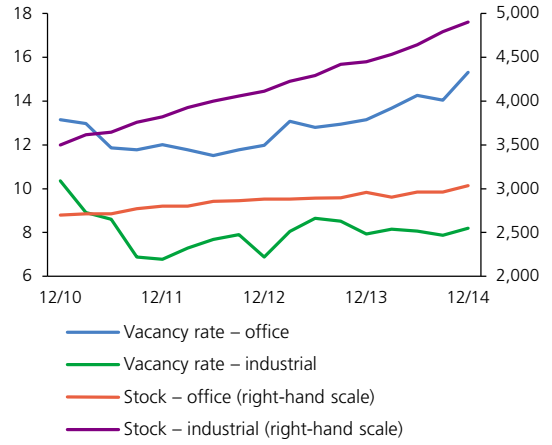
Planned supply and realised demand on the commercial property market
(2000–2013 average = 100)



Source: Jones Lang LaSalle
Note: Supply of industrial, retail and office property calculated from new supply in m²; realised investments from data in EUR.

CHART II.53

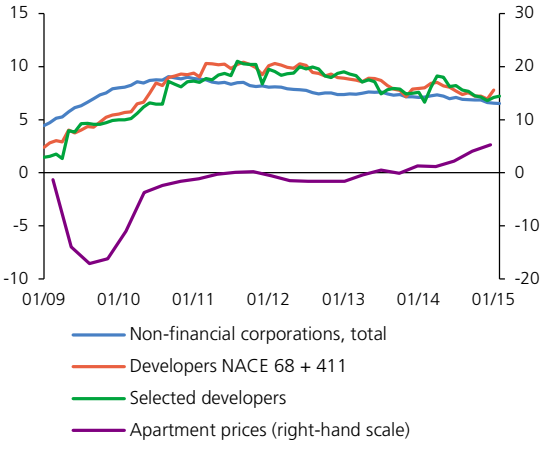
Total stock and vacancy rates
(vacancy rate in %; stock in thousands of m² on right-hand scale)



Source: Jones Lang LaSalle

CHART II.54

NPL ratios in the property development sector
(%; year-on-year growth for apartment prices on right-hand scale)



Source: CNB, CZSO

12% year on year).[35] Owing to an expected further rise of 22% in newly completed office space next year, the vacancy rate will continue to go up (to as much as 16.8% according to a forecast by Jones Lang LaSalle). In addition, higher new supply of office space in the prime office segment is crowding out take-up of older, lower-quality office projects, which are not covered by the official statistics. The owners of such projects are often being forced to react with rent cuts, which are negatively affecting their financial situation. Compared to office property, the situation in the industrial property segment is considerably better. Although new construction is also quite buoyant in this segment (completions were up by 31% year on year), supply is more flexible than for other types of commercial property and construction is now mostly based on pre-lease. The industrial property market therefore has a lower and more stable vacancy rate, which rose by only 0.26 pp to 8.2% in 2014 (see Chart II.53). The retail property situation is also relatively favourable, aided by renewed household consumption. Owing to relatively high penetration, new construction is falling (and is currently at less than half of the long-term average; see Chart II.52), whereas rental take-up is increasing. This is putting upward pressure on rents.

The NPL ratio in the property development sector decreased

The generally better conditions for residential and commercial development projects[36] were reflected in a further moderate decline in the NPL ratio among developers of 0.9 pp year on year (see Chart II.54). The NPL ratio is now similar to that for the non-financial corporations sector as a whole. At the same time, the recovery in activity on the property market was reflected in a rise in new loans to developers of 24% year on year, following five years of declines. However, the amount of new loans remains up to five times lower than before the onset of the financial crisis. A large part of the renewed development activity is therefore being financed from developers' own funds or from abroad. Another part of the construction activity is being financed by loans only shortly before completion. The risky tendencies in the development sector include a further rise in foreign currency loans (whose share in total loans was up from 37% at the end of 2013 to 45% at the end of 2014). Despite natural hedging of these loans (most transactions on this market are denominated in euro), developers are becoming more sensitive to exchange rate movements, as the situation of tenants, to whom the currency risk is transferred, depends primarily on the performance of the domestic economy. Rising long-term growth in the exposure and concentration of bank portfolios vis-à-vis the real estate sector also poses a risk.[37]

35 This is relatively high even by comparison with Central European capitals. At the end of the year the vacancy rate was 7.7% in Berlin, 11.2% in Bratislava and 13.3% in both Warsaw and Bucharest. Only Budapest had a higher vacancy rate than Prague (16.2%), but it fell by 1.1 pp year on year (all data from Jones Lang LaSalle).

36 The amounts of NPLs and new loans can only be assessed for developers active in residential and commercial property as a whole, as few corporations provide information on their activities in a detailed breakdown.

37 For details, see the thematic article *Credit Portfolio Sector Concentration and its Implications for Capital Requirements* in this Report.

3 THE FINANCIAL SECTOR

3.1 DEVELOPMENTS IN THE FINANCIAL SECTOR

The developments recorded in the Czech financial sector were mostly positive in 2014. In an environment of economic recovery, the banking sector increased its profitability and strengthened its capital adequacy and liquidity. It is comfortably compliant with the new European regulatory rules. Insurance companies are well capitalised and most of them are maintaining stable profitability. The sector's performance, however, was adversely affected by external developments. Investment funds, which are offering an alternative to bank deposits in an environment of low interest rates, are showing dynamic growth. The process of stabilisation of the credit unions segment continued, and legislative changes regulating their activities in accordance with cooperative principles were approved. The pension management companies sector is also stable. Following the abolition of the second pillar, planholders are saving in traditional transformed funds and new participation funds, which may have a riskier profile.

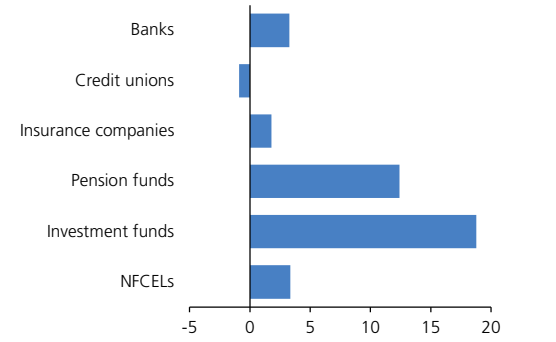
The main risk scenario for the financial sector is a renewed economic recession leading to a sharp deterioration in its profitability. Credit risk remains the principal source of systemic risk. Credit risk decreased in the area of loans to residents. However, the difficult geopolitical situation is generating increased risks in the area of loans to non-residents and also to residents with strong direct or indirect economic links to vulnerable regions.

The economic recovery was accompanied by growth in the financial sector's assets; collective investment funds saw dynamic growth

Total assets increased year on year in almost all segments of the financial market (see Chart III.1). The banking sector recorded the largest absolute growth in assets (CZK 168 billion, or 3.3%). It remains the dominant segment of the Czech financial market, accounting for almost 80% of total assets. The highest growth rates were recorded by investment funds (CZK 46 billion, or 18.8%) and pension funds (CZK 37 billion, or 12.4%). The segments of insurance corporations and non-bank financial corporations engaged in lending (NFCELs) saw no major changes in size. The total assets of credit unions decreased for the second consecutive year (by CZK 0.3 billion, or 0.9%), again due mainly to one credit union's licence being revoked.

CHART III.1

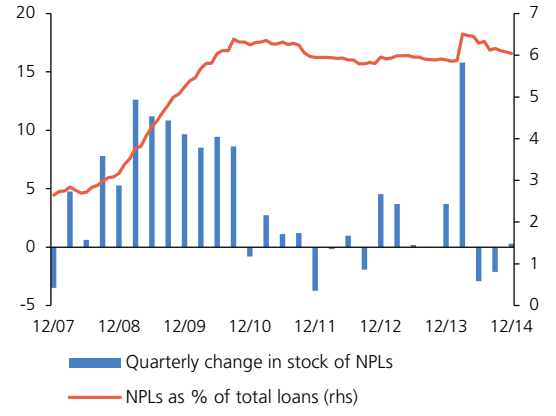
Year-on-year change in assets of financial sector segments
(%)



Source: CNB

CHART III.2

NPLs in the Czech banking sector
(CZK billions, %; client loans)



Source: CNB

TABLE III.1

Structure of NPLs
(%)

	NPLs by categorisation			
	Substandard	Doubtful	Loss	NPLs, total
2011	32.7	13.9	53.4	100.0
2012	27.0	14.3	58.7	100.0
2013	26.5	14.3	59.2	100.0
2014	29.1	11.2	59.7	100.0
2014*	25.8	9.0	65.2	100.0

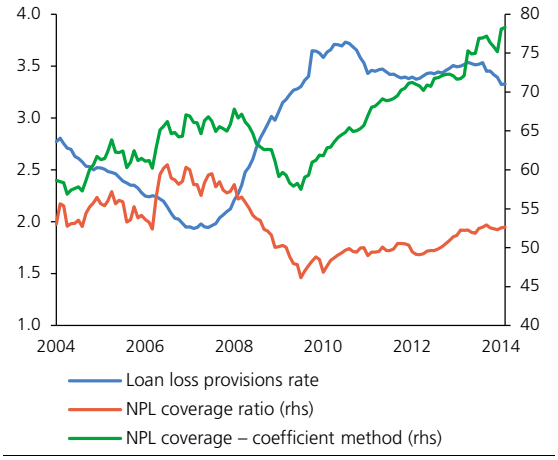
	NPLs past due			
	Not past due	Up to 3M past due	More than 3M past due	NPLs, total
2011	46.2	9.1	44.7	100.0
2012	43.6	9.2	47.2	100.0
2013	42.0	6.7	51.3	100.0
2014	41.1	8.2	50.7	100.0
2014*	35.8	8.8	55.4	100.0

	NPLs by collateralisation			
	Collateralised loans to households and corporations	Non-collateralised loans to households and corporations	Other loans	NPLs, total
2011	36.8	30.6	32.6	100.0
2012	35.5	29.4	35.1	100.0
2013	32.1	30.6	37.3	100.0
2014	28.3	28.2	43.5	100.0
2014*	31.2	31.1	37.7	100.0

Source: CNB, CNB calculation
Note: Collateralised loans = loans for house purchase + loans to corporations backed by property and at least two other types of collateral (pledged receivables, movables, securities, sureties, guarantees, etc.). Other loans are loans not included in the collateralised and non-collateralised categories.
* After adjustment for the one-off increase in NPLs in the portfolio of the Czech Export Bank in March 2014.

CHART III.3

Provisions and coverage of NPLs by provisions
(%)



Source: CNB
Note: The calculations do not take into account the effect of the one-off increase in NPLs in the portfolio of the Czech Export Bank in March 2014.

A decrease in credit risk as expressed by the NPL ratio for loans to residents was accompanied by an increase in credit risk vis-à-vis non-residents

Credit risk in banks' balance sheets, as expressed by the ratio of non-performing loans (NPLs) to total loans, was adversely affected by a sharp rise in the non-resident segment in March 2014, due to which NPLs jumped by 10.8%[1] compared to February 2014 (see Chart III.2). The NPL ratio was thus 0.1 pp higher at the end of 2014 than at the end of 2013, at 6.0%. In the case of residents, however, it dropped by 0.4 pp year on year to 5.1% at the year-end (down by 0.5 pp to 6.6% for non-financial corporations and by 0.3 pp to 4.7% for households). The improvement in both sectors was due to a combination of growth in loans provided and an absolute decline in NPLs. Although this decline was partly due to write-offs of such loans from banks' balance sheets, the write-off rate was low compared to the past five years.[2] By contrast, the NPL ratio for loans to non-residents surged by 4.0 pp to 13.1% and may rise further in some banks owing to geopolitical developments.[3]

The quality of the NPL portfolio continues to deteriorate

In 2014, NPLs migrated to the worst, i.e. loss, category at roughly the same pace as in 2013 (recording growth of 0.5 pp to 59.7% compared to December 2013). The share of loans in the substandard category rose significantly (by 2.7 pp to 29.2%). The share of NPLs that are not actually past due fell slightly in 2014 (to 41.1% at the end of 2014) and growth in the proportion of NPLs more than three months past due halted. However, the modest improvement in the NPL structure was mostly due to the aforementioned one-off sharp increase in non-resident NPLs in March 2014. Adjusted for this effect, the rate of migration of NPLs to the loss category and the length of the default period are increasing compared to past years. The collateral distribution of loans is also changing, to the detriment of collateralised NPLs (see Table III.1).

Coverage of NPLs by provisions rose slightly…

Banks should adjust their provisioning to reflect the continuing shift of the NPL portfolio to the loss category. The overall coverage of NPLs by provisions rose slightly in 2014 (by 1 pp to 52.6%).[4] This rise can be seen as positive, especially given the aforementioned continued decline in the share of collateralised NPLs. The rising share of the loss NPL category is further widening the gap between the actual level of provisioning and its conservative level calculated "mechanically" using the coefficient method, where impairment losses are not estimated on the basis of models, but are determined using coefficients laid down in a decree (see

1 This change was due to loan reclassification by the Czech Export Bank.
2 The average write-off rate in 2014 was 8.1% of the NPL volume, compared to 7.7% in 2013, almost 9% in 2012 and 10.5% in 2011 and 2010.
3 See the thematic article *Credit Portfolio Sector Concentration and its Implications for Capital Requirements* and the country risk sensitivity analysis in section 3.2.
4 The calculation does not take into account the effect of the one-off increase in NPLs in the portfolio of the Czech Export Bank in March 2014. If that were included, the overall NPL coverage ratio would fall to 47.8%.

Chart III.3).[5] This calculation does not take into account the collateralisation of NPLs, which reduces the necessary level of provisioning, but this indicator should not be ignored given the falling share of collateralised NPLs and the rising share of non-collateralised NPLs (see Table III.1).

… but some banks remain below the sector's average coverage levels

Looking more closely at the year-on-year change in the NPL coverage ratios in banks with market shares exceeding 1%, mostly favourable developments are apparent in 2014. However, one large bank and one building society exhibited an undesirable combination of a fall in the NPL coverage ratio and a rise in the NPL ratio. At the same time, there are still banks whose coverage ratios lie well below the sector average (see Chart III.4). The coverage adequacy in these banks is being individually assessed as part of the CNB's supervisory activities.

Some indicators suggest a decline in hidden balance-sheet credit risk…

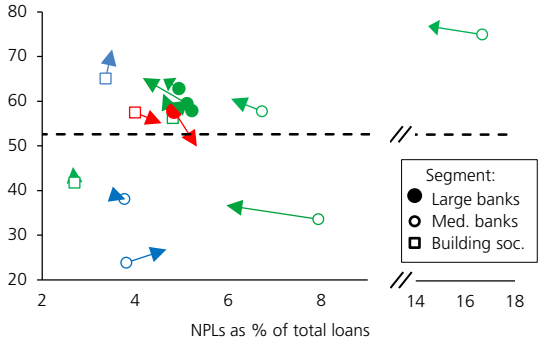
There are loans in banks' balance sheets that are not currently classified as NPLs even though they are at risk of default. These are loans to clients who have credit from several banks and some of those banks already classify their claims on such clients as NPLs while others still record their loans to such clients as performing loans. Loans to such clients classified as performing loans represent a possible source of underestimation of NPLs and thus of the credit risk in banks' balance sheets. Underestimation of NPLs to resident non-financial corporations of CZK 5.5 billion was identified at the end of 2014 using Central Credit Register (CCR) data (see Chart III.5).[6] This indicator declined by more than 26% (CZK 1.9 billion) year on year, but underestimation of NPLs to resident non-financial corporations still accounts for about 9.4% of NPLs in this segment. This decline may be partly due to an overall decrease in NPLs to resident non-financial corporations in banks' balance sheets. However, the pace of the decline is much higher than that for NPLs. This suggests greater consistency in the categorisation of loans across banks. Despite the positive trend in the amount of underestimation, its inclusion in total NPLs would mean an increase of 0.6 pp in the ratio of NPLs to resident non-financial corporations to 7.2% at the end of 2014.

… and off-balance-sheet risk

To quantify the credit risk stemming from off-balance-sheet items, risky guarantees and risky loan commitments were calculated using CCR data. These are defined as guarantees and irrevocable loan commitments given

CHART III.4

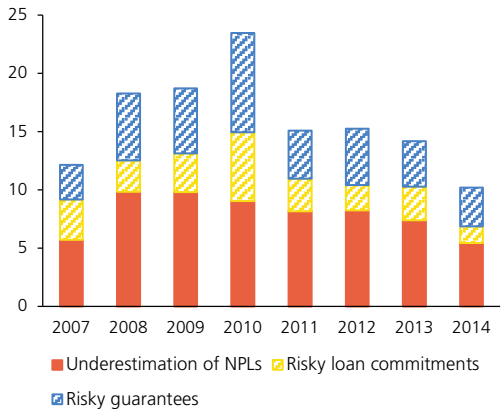
Year-on-year change in NPL coverage ratios across banks
(y-axis: % of NPLs covered by provisions; arrows indicate change between end of 2013 and end of 2014)



Source: CNB
Note: Green colour indicates an improvement, red colour a deterioration, and blue colour an ambiguous path of the combined risk position. Only banks (excluding branches of foreign banks) and building societies with market share > 1% (as measured by total outstanding loans) are included. The dashed line marks the mean NPL coverage ratio of 52.6% at the end of 2014.

CHART III.5

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



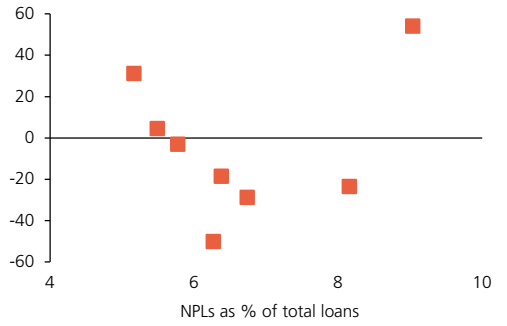
Source: CNB
Note: Underestimation of NPLs = volume of loans provided to clients that are not classified as NPLs even though some bank has already classified its loans to the given clients as NPLs. Risky guarantees/loan commitments = volume of guarantees/irrevocable loan commitments given to clients who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

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

6 Owing to data unavailability, it is not possible to perform an analogous analysis for the household sector.

CHART III.6

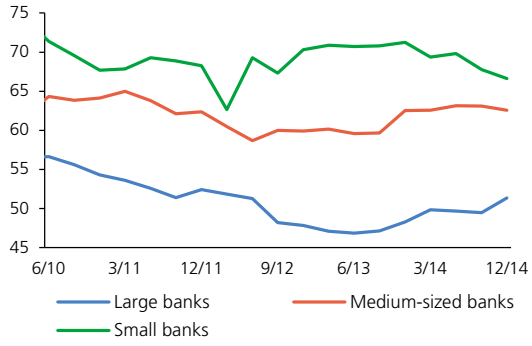
Bank credit portfolio quality and lending to risky segments
(y-axis: year-on-year change in loans to risky segments in %; as of 31 December 2014)



Source: CNB
Note: Risky credit segments are defined according to credit provided to non-financial corporations with the highest default rate in 2010–2013. The segmentation is by industry, turnover and number of employees of the firm. Only banks (excluding branches of foreign banks) with market share > 1% are included.

CHART III.7

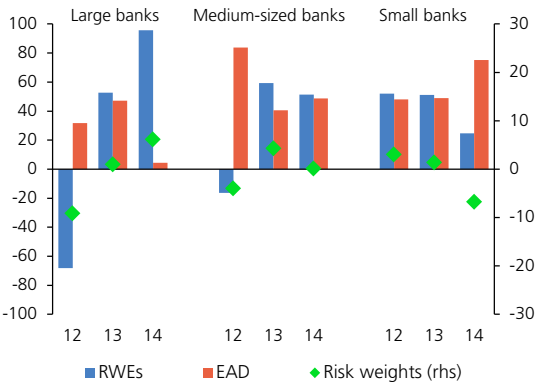
Risk weights for banks' credit portfolio
(%)



Source: CNB
Note: The calculation of risk weights covers credit risk net of sovereign exposures. Relevant exposures in the trading portfolio, investment portfolio and off-balance sheet were included in the calculation.

CHART III.8

Risk weights and their decomposition
(%, year-on-year changes)



Source: CNB
Note: Risk weights are defined as the ratio of risk-weighted exposures (RWEs) to exposure at default (EAD) approximated by exposures in the investment portfolio less sovereign exposures. The decomposition of the change in risk weights is constructed in such a way that the sum of absolute values of RWE and EAD contributions is always equal to 100%.

to non-financial corporations whose bank loans are classified as NPLs. Their evolution since the end of 2010 suggests declining credit risk arising from off-balance-sheet items. However, if this risk were to materialise in full, NPLs would rise by a further CZK 4.7 billion. Including the underestimation of credit risk in banks' balance sheets and off-balance sheets, the share of NPLs to non-financial corporations would have been 7.8% at the end of 2014.

Risk indicators for new loans to non-financial corporations are showing positive tendencies

An analysis of lending to non-financial corporations reveals that year-on-year growth in new loans in 2014 was recorded mainly in banks with lower NPL ratios.[7] Most banks with significant market shares also cut their lending to risky segments (see Chart III.6). Lending to the most risky segments also dropped in banks accounting for more than 1% of the market as a whole, and the default rates on loans provided by banks to non-financial corporations in 2013[8] were lower by comparison with new loans in previous years.[9]

The long-running decline in aggregate risk weights halted

Risk weights can also be used to assess the riskiness of bank portfolios. These are calculated as the ratio of risk-weighted exposures (RWEs) for credit risk to exposures at default (EAD).[10] Total risk weights – adjusted for sovereign exposures – increased by 2.3 pp year on year to 52.5%, thus continuing the upward trend which started in 2013 H2. In 2014, the growth was driven mainly by large banks (growth of 3.0 pp compared to the end of 2013, to 51.3%). By contrast, risk weights in small banks decreased by 4.7% compared to the end of 2013 and were flat in medium-sized banks (see Chart III.7). The decomposition of the change in risk weights also reveals that in cases where the weights were increased, the growth in risk-weighted exposures considerably exceeded the growth in EAD and vice versa (see Chart III.8). Box 2 analyses the factors affecting the level and evolution of risk weights in 2009–2014 in more detail.

BOX 2: AN ANALYSIS OF THE FACTORS AFFECTING THE RISK WEIGHTS OF CZECH BANKS AND OF THE EVOLUTION OF THOSE WEIGHTS IN 2009–2014

In this box, we analyse the effect of the regulatory approach, business model and business cycle on the level and evolution of

7 Data for households are not available for this type of analysis.
8 Here, the default rate is measured for each year as default in the next 6, 12, 18 months etc. and is therefore not available for loans provided in 2014.
9 See the thematic article *Use of the Czech Central Credit Register for Financial Stability Purposes* published in this Report.
10 The risk weights only relate to credit risk and take into account both balance-sheet and off-balance-sheet items. The calculations use COREP data on a solo basis.

the risk weights used to determine the capital requirements for credit risk, whose comparability and consistency have recently come under increased scrutiny.[11]

Risk weights are affected by the regulatory approach…

The current CRD IV/CRR regulatory framework allows the standardised approach (STA) and the internal ratings based (IRB) approach to be used to set risk weights for the purposes of determining capital requirements for credit risk. The STA approach takes into account the type of exposure, its external rating and the quality of collateral. The IRB approach is based on the internal rating set by banks and takes into account the perceived risk of various asset classes in a given economic environment. In the Czech Republic, the IRB approach is used by all large banks and some medium-sized banks, with a combined market share of around 80%. The level of risk weights[12] in banks using the STA and IRB approaches differs across the main asset classes (see Table III.1 Box) and the difference increases with the level of risk of the asset class. The difference is due to the nature of the IRB approach. When using this approach, the bank implicitly derives the risk weights based on its own assessment of the riskiness of the portfolio, i.e. on the basis of its own model estimates of the probability of default (PD) and the loss given default (LGD). In a standard economic environment, the risk weight is lower in IRB banks than in STA banks, except in the case of exposures to central governments.

… the bank's business model…

For the purposes of this box, we classify a bank's business model based on the structure of its credit exposures to the main market segments (see Table III.1 Box). In this classification, the banks under review[13] are divided into four categories. The first (see Chart III.1 Box, plotted in blue) is dominated by less risky exposures to central governments and institutions, and the banks in this category show the lowest risk weights. The other categories of banks generally have riskier exposures to the corporate and retail sectors in various ratios. Banks that are predominantly exposed to the corporate sector are assigned to the second category (see Chart III.2 Box, plotted in red) and have the highest risk weights.[14] Banks whose retail exposures are

11 EBA (2015): *Joint Committee Report on Risks and Vulnerabilities in the EU Financial System*, March 2015, p. 5.
12 The risk weights used in this box only apply to credit risk and only take into account balance-sheet items.
13 i.e. all banks that operated on the Czech market throughout the year, except for the Czech Export Bank and the Czech-Moravian Guarantee and Development Bank. Foreign bank branches and building societies are also excluded.
14 Changes in business model also affected the movements in risk weights of individual institutions in the period under review. Only one of the STA banks predominantly exposed to the corporate sector (see Chart III.2 Box) saw a risk weight decrease despite a rise in the

TABLE III.1 BOX

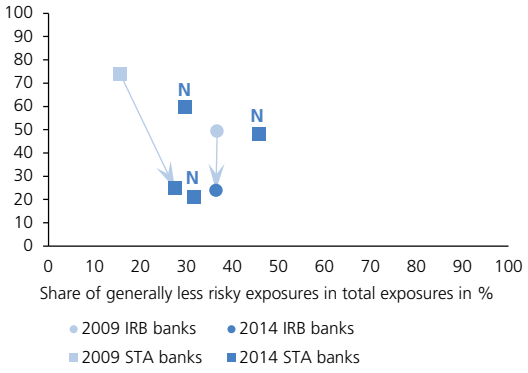
Risk weights for the main asset classes for IRB and STA banks in 2014
(%)

	Central governments		Institutions		Retail		Corporate sector	
	IRB	STA	IRB	STA	IRB	STA	IRB	STA
Weighted average RW	2	0	29	43	38	37/74**	65	92
Historically highest RW – IRB (2009–2014)	6		35		43		79	
Regulatory RW – STA*		0		20		35/75**		100
Std. dev. of RW – IRB	1		3		2		6	

Source: CNB
Note: * This is the usual RW in the given segment portfolio for exposures to which an external rating has not been assigned. The true risk weight can be affected by the collateral quality of the exposure as well as the external rating.
** The first figure refers to the risk weight for mortgage loans and the second to the risk weight for other retail loans.

CHART III.1 BOX

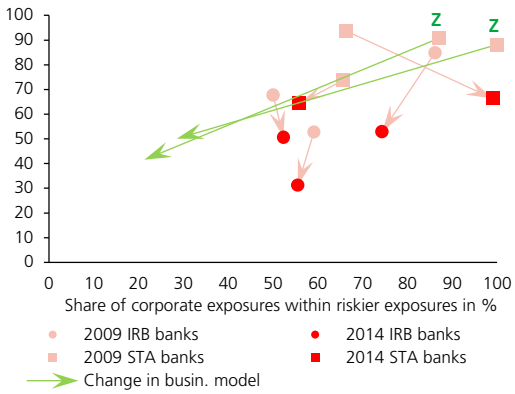
Banks predominantly exposed to central governments and institutions
(y-axis: risk weight in %)



Source: CNB
Note: The connecting lines indicate the same bank in 2009 and 2014. Unconnected banks entered the market after the start of 2009 (and are denoted by the letter N).

CHART III.2 BOX

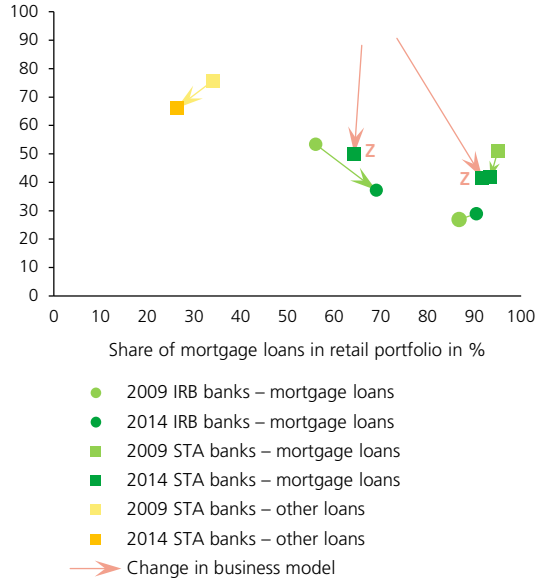
Banks predominantly exposed to the corporate sector
(y-axis: risk weight in %)



Source: CNB
Note: The connecting lines indicate the same bank in 2009 and 2014. Banks which underwent a change in business model according to the given classification in the period under review are denoted by the letter Z.

CHART III.3 BOX

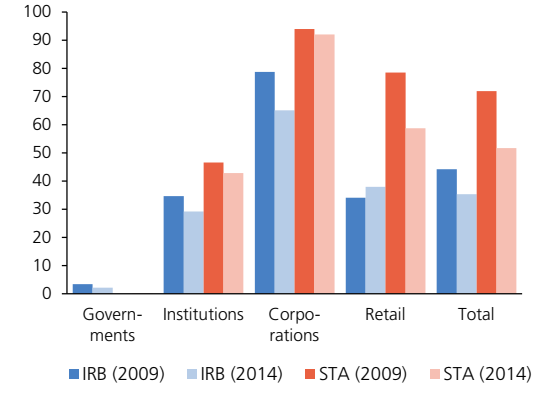
Banks predominantly exposed to the retail sector within generally riskier exposures
(y-axis: risk weight in %)



Source: CNB
Note: The connecting lines indicate the same bank in 2009 and 2014. Banks which underwent a change in business model according to the given classification in the period under review are denoted by the letter Z.

CHART III.4 BOX

Weighted average RW for segment portfolios of STA and IRB banks
(y-axis: risk weight in %)



Source: CNB

dominated by mortgage loans are included in the third category (see Chart III.3 Box, plotted in green) and have generally lower risk weights. Banks in which other retail loans dominate are assigned to the fourth category (see Chart III.3 Box, plotted in orange) and have generally higher risk weights. We can thus say that the risk weights are significantly affected by the bank's business model and that the risk weight of IRB banks is lower than that of STA banks with a similar business model.

… and its evolution…

The risk weights of Czech banks have decreased since 2009 (see Chart III.4 Box). Between 2009 and 2014, the weighted average risk weight fell from 44% to 35% in the case of IRB banks and from 72% to 52% in the case of STA banks. The change in credit exposure structure towards less risky assets is an important factor explaining the decline in risk weights. The aggregated balance sheet of IRB banks saw a 4% increase in the share of generally less risky exposures, while STA banks even recorded a 13% rise. As regards the structure of generally riskier exposures, the share of the retail sector rose by 1% in IRB banks and by 9% in STA banks. The retail portfolio of IRB banks saw a 9% increase in the weight of less risky mortgage loans to the detriment of other loans. The increase for STA banks was 6%. The change in the balance-sheet structure thus also explains the larger decline in STA banks' risk weights.

… the business cycle also plays a role, especially in the corporate exposures of IRB banks

The risk weights for credit exposures to the main market segments differed considerably between IRB and STA banks in 2009–2014 (see Chart III.4 Box). The segment risk weights for exposures to the corporate sector in IRB banks decreased by 14%, while those in STA banks dropped by only 2%. STA banks recorded a drop in segment risk weights of 20% for the retail portfolio, whereas IRB banks saw an increase of 4%. Especially important as regards the impact on IRB banks' capital is the decline in, and high variance of, risk weights for exposures to the corporate sector (see Table III.1 Box). The probability of default for corporate exposures is closely linked with the business cycle, which thus affects the risk weights. This is evidenced by the correlation between the default rate for these exposures[15] and GDP (see Chart III.5 Box), which was -0.51 in 2004–2013 and -0.72 in 2004–2011. The decline in risk weights can thus be

share of exposures to the corporate sector within generally riskier exposures. In this bank, however, exposures to retail were replaced mainly by exposures to central governments, so the risk weight decreased.

15 Data on the default rate for corporate exposures for 2014 will be available at the end of 2015.

explained to some extent by the ongoing recovery of the Czech economy. To assess the dispersion of risk weights for corporate exposures more objectively, one can use a benchmark portfolio method where individual banks assign risk weights to an identical sample of exposures. Using this method, it is possible to assess the impact of a potential model distortion on the capital requirement for credit risk of IRB banks. As the risk weight levels are crucial for ensuring that banks are sufficiently capitalised, the CNB is paying special attention to this area. Risk weight issues are also under discussion at international level. The BCBS is currently preparing a revision of the approaches for setting risk weights.[16]

Capital adequacy is favourable…

The Czech banking sector is continuing to strengthen its capital adequacy. Its total regulatory capital rose by CZK 29 billion in 2014, reaching CZK 397 billion at the year-end. The sector's overall capital ratio rose to 18.0%, while its Tier 1 capital ratio is at 17.5% (see Chart III.9).[17] The banking sector is thus compliant with the new CRD IV/CRR capital regulations by a sufficient margin. This is also evidenced by the fact that banks representing more than 73% of the sector's assets had a Tier 1 capital ratio exceeding 15% at the end of 2014 and that the lowest individual Tier 1 capital ratio was 9.5%.

… and the leverage ratio is sufficient

Capital adequacy can also be examined using the leverage ratio, which Basel III defines as the ratio of Tier 1 capital to non-risk-weighted exposures. The advantage of this indicator is its relative simplicity and its robustness to efforts by banks to optimise the calculation of risk weights (or capital requirements). The leverage ratio is expected to be implemented under the new CRD IV directive as from 2018 (see section 4.6). The aggregate leverage ratio of the Czech banking sector was 7.2% at the end of 2014, well above the preliminary 3% minimum regulatory limit. Although the leverage ratio of most banks significantly exceeded the 3% limit, there was significant heterogeneity across banks. Some were close to the 3% limit at the end of 2014, and two were even below it (see Chart III.10). The low leverage ratio of one of these two banks was largely due to high concentration of sovereign exposures in its balance sheet, while the other has a high concentration of off-balance-sheet exposures. The causes of non-compliance with the leverage ratio provide a good illustration of one intended effect of the leverage ratio, namely to curb excessive growth in the balance sheet and off-balance sheet.

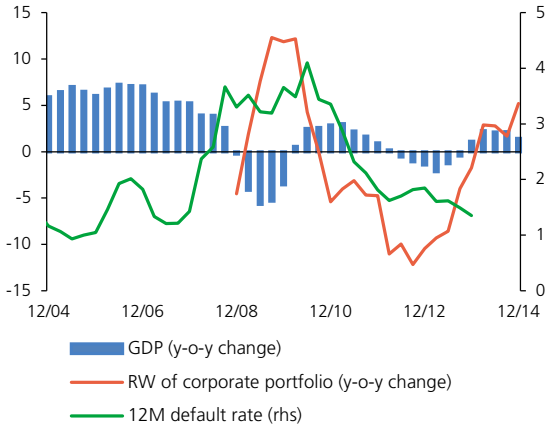
16 See BIS (2014): *Capital Floors: The Design of a Framework Based on Standardised Approaches* – consultative document; BIS (2014): *Revisions to the Standardised Approach for Credit Risk* – consultative document.

17 Tier 1 for the Czech banking sector is almost identical to the newly required Common Equity Tier 1.

CHART III.5 BOX

Relationship between annual GDP growth, risk weights for corporate exposures and the 12M default rate

(%)

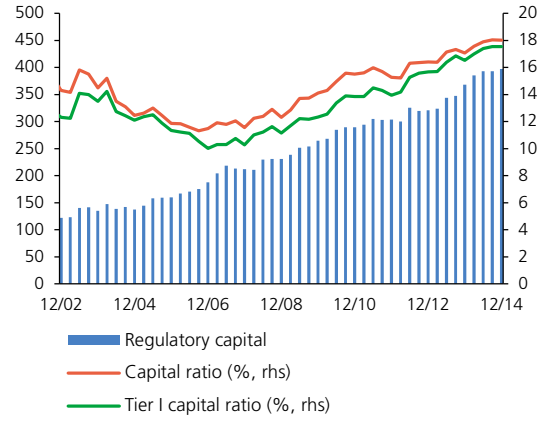


Source: CNB, CZSO

CHART III.9

Capital and capital ratio in the Czech banking sector

(CZK billions; %)

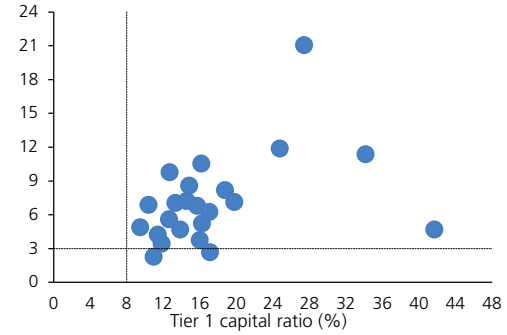


Source: CNB

CHART III.10

Tier 1 capital ratio and leverage ratio across banks at the end of 2014

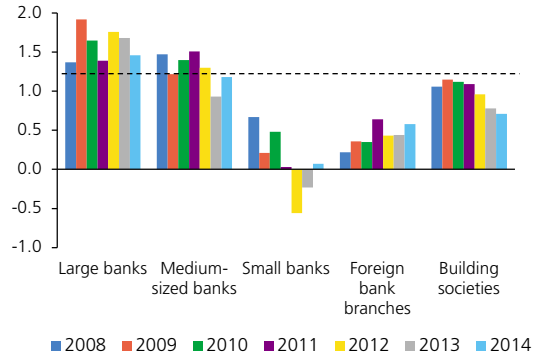
(y-axis: leverage ratio in %)



Source: CNB

CHART III.11

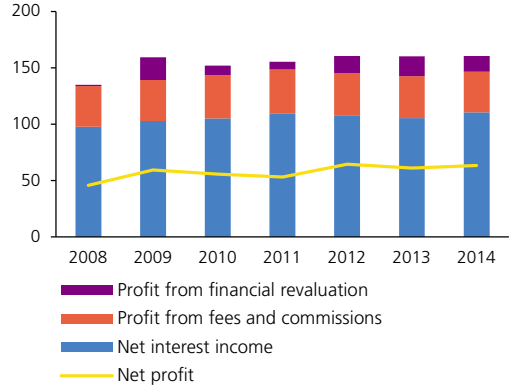
Return on assets (RoA)
(%)



Source: CNB
Note: The classification of banks by asset size relates to the year for which the RoA value is reported. The horizontal line depicts the RoA value for the banking sector as a whole for 2014.

CHART III.12

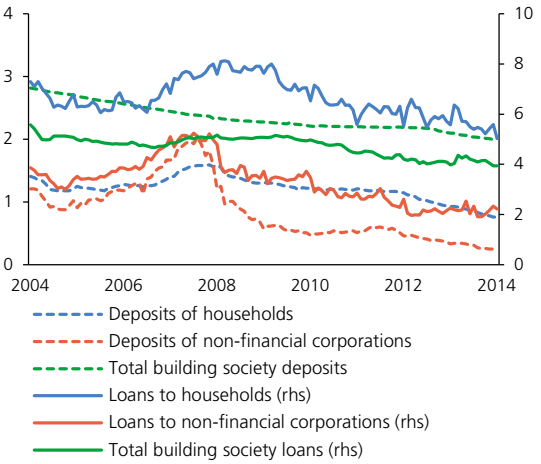
Key components of profit from financial activities
(CZK billions)



Source: CNB

CHART III.6 BOX

Interest rates on deposits and loans
(%)



Source: CNB
Note: Loans consist solely of new loans to residents. Deposits comprise all deposits from residents.

The profitability of the banking sector remains high…

The Czech banking sector has long been profitable and its profitability significantly exceeds the euro area average.[18] The return on assets (RoA) of the banking sector as a whole was 1.2% in 2014 (the euro area average was 0.2% in 2013), down by 0.1 pp year on year. However, large differences persist across banking sector segments. The sector's profitability is determined above all by the performance of large banks, which account for 57.1% of the banking sector's assets. The RoA of large banks remains high (see Chart III.11) despite a year-on-year decrease of 0.2 pp to 1.5%. A 0.3 pp improvement in this indicator for medium-sized banks and a positive RoA (0.1%) in small banks, which have emerged from a two-year period of losses, are positive signals. The profitability of building societies is being adversely affected by their legislative framework, which limits their ability to respond quickly to a decline in interest rates.

… interest profit increased after two years of decline

The sector's net profit rose by 4.0%[19] year on year (see Chart III.12), mainly because of lower provisioning and higher interest profit, which is a key component of earnings. The downward trend in net interest profit seen in previous years reversed in 2014. In addition to a rising amount of loans, the increase in interest profit was due to stabilisation of interest rates on loans to non-financial corporations and on consumer credit coupled with a continuing decline in deposit rates. Profit from fees and commissions fell slightly for the third year in a row, reflecting persisting competitive pressure on the credit, deposit and other banking services markets. Profit from financial revaluation also decreased in year-on-year terms.[20] However, the long-running environment of low interest rates may have a negative effect on the banking sector's profitability (see Box 3).

18 See CNB (2014): *Analyses of the Czech Republic's Current Economic Alignment with the Euro Area*, p. 94.
19 Domestic banks' profit also includes dividends paid by their subsidiaries. They totalled more than CZK 8.8 billion in 2013 and dropped to CZK 6.7 billion in 2014. Excluding dividend profit, the banking sector's profitability would have risen by 8.6% year on year.
20 Financial revaluation consists mainly of gains or losses on financial assets and liabilities held for trading and valuation changes.

BOX 3: RISKS OF SUSTAINED LOW INTEREST RATES FOR THE DOMESTIC BANKING SECTOR

The environment of sustained low interest rates may have a major impact on interest income on loans, which is the biggest component of the domestic banking sector's profit. Interest rates on loans to non-financial corporations have fallen significantly since 2008, followed, with a lag, by rates on loans to households (see Chart III.6 Box). This has not been fully offset by a corresponding decline in the deposit rate, a fact reflected in a decline in net interest margins for key components of banks' loan portfolios (see Chart III.7 Box). At the same time, the stock of loans to non-financial corporations and consumer credit has been flat (see Chart III.8 Box), resulting in a decline in net interest income across the banking sector.

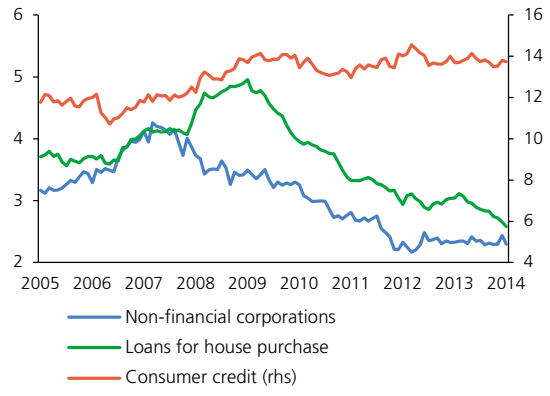
The decline in income has so far been offset by corresponding changes in costs. The ratio of operating costs to total assets declined constantly between 2009 and 2014. The ratio of impairment losses to total assets also fell in the same period, especially in the first half of it (see Chart III.9 Box). The decline in the net interest margin and interest income has therefore had only a slight impact on the banking sector's profitability as measured by RoA (see line BS.43 in the *Table of Indicators*), which also remains high in international terms. The only exception is the small banks segment, which remains vulnerable due to its price policy.[21] The building societies segment, where there is little room for further cuts in operating costs, is also less adaptable. The level of deposit rates is much higher in this segment than in the rest of the market, as the legislative framework for building saving schemes limits the scope for rapid interest rate adjustment or changes in business model (see Chart III.6 Box). This is negatively reflected in building societies' lending competitiveness, as evidenced by a relatively low loan-to-deposit ratio, which stood at 61.1% in 2015 Q1.[22]

At the end of 2014, banks were making most of their interest income from loans to households for house purchase (40%), followed by consumer credit and loans to non-financial corporations (both 30%; see Chart III.10 Box). Interest income is being negatively affected by a decline in the rate on new loans for house purchase (including refinanced loans) and by the gradual refixation of those loans at lower rates (see Box 1, section 2.3). This effect is being partly offset by growth in the stock of loans

21 Small banks are pursuing a more aggressive price policy than other banks in order to gain a larger market share.
22 The loan-to-deposit ratio of the banking sector as a whole was 76.1% in the same period.

CHART III.7 BOX

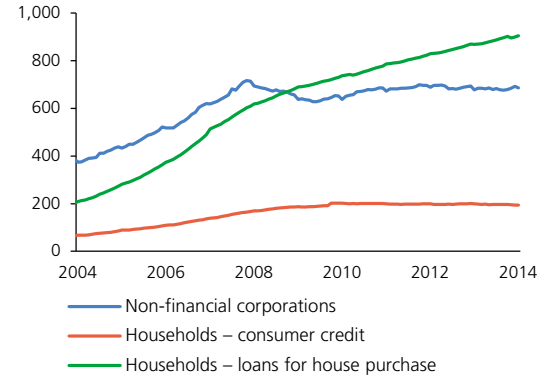
Net interest margin on new bank loans by borrower sector
(%)



Source: CNB
Note: Net interest margin is calculated as the interest rate on new loans minus the rate on existing bank deposits.

CHART III.8 BOX

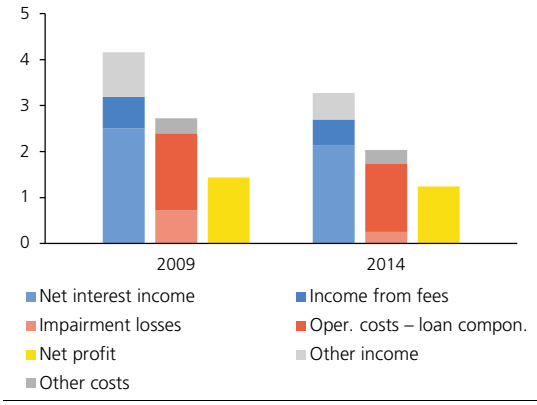
Stock of bank loans by borrower sector
(CZK billions)



Source: CNB

CHART III.9 BOX

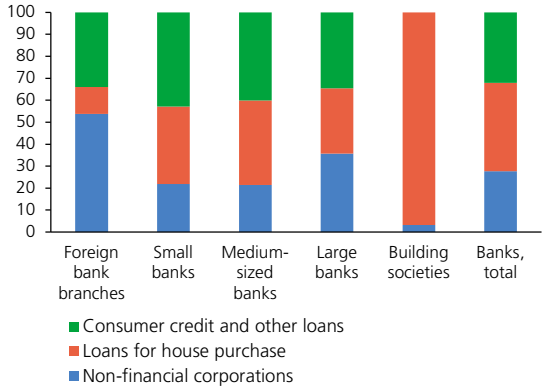
Composition of revenues and costs of banks in the Czech Republic
(% of assets on gross basis)



Source: CNB

CHART III.10 BOX

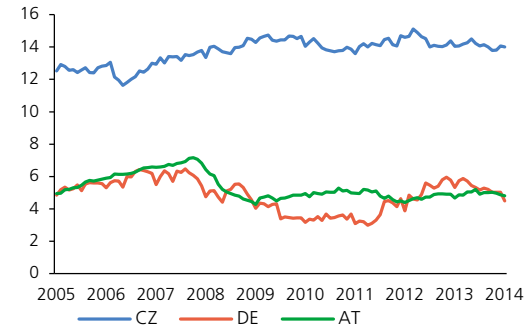
Shares of individual loan types in total loan interest income by bank type
(%)



Source: CNB
Note: Both total interest income and the interest income on individual components of the loan portfolio are calculated as the stock of loans as of the given period multiplied by the weighted interest rate on those loans. "Banks, total" includes building societies, for which loans to households for house purchase generate the bulk of their interest income.

CHART III.11 BOX

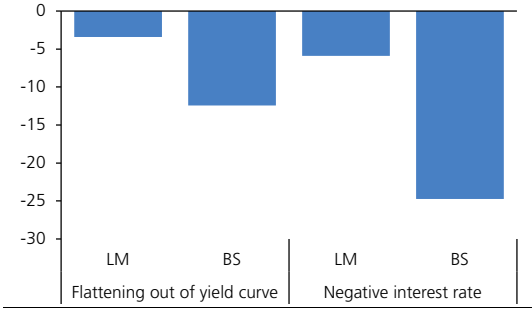
Interest rates on new bank consumer credit in the Czech Republic and abroad
(%)



Source: CNB, ECB
Note: The interest rate on loans to households for consumption in Germany and Austria encompasses floating rate loans and loans with rates fixed for up to one year.

CHART III.12 BOX

Simulation of the change in net interest income in response to a change in market interest rates at the three-year horizon
(change compared to initial period in %)



Source: CNB
Note: Note: Flattening out of yield curve – interest rate spread decreases to 5 bp. Negative interest rate – long-term rates fall to -0.8% while short-term rates remain flat at 0.05%. LM = large and medium-sized banks, BS = building societies.

(see Chart III.8 Box). A sizeable drop in the consumer credit rate, which has long been much higher than the rate on the other types of loans, could have a major impact on interest income.[23] This difference is larger in the Czech Republic than in advanced euro area countries (see Chart III.11 Box). The risk of a decline in rates on consumer credit could be exacerbated by increased competitive pressures from foreign banks and their branches in the Czech Republic or from non-bank intermediaries. Moreover, the low interest rates on deposits of households and non-financial corporations (see Chart III.6 Box) are limiting the room for further offsetting the decline in loan rates.

As simulations[24] indicate (see Chart III.12 Box), a further decline in market interest rates could lead to a fall in banks' interest income. Building societies are more sensitive, and large and medium-sized banks less sensitive, to such developments. This is evidenced by the relative resilience of large and medium-sized banks to changes in the interest rate spread (the difference between long-term and short-term rates[25]). The banking sector as a whole recorded no losses due to a decline in interest income in any of the simulations. However, if long-term rates were to turn significantly negative and banks were not able to respond in time by changing their business strategy, banks' net interest income – and hence also their profitability – might drop more markedly.

The volume of deposits in the banking sector increased, while interest rates continued to fall

The growth rate of deposits declined compared to 2013. Koruna bank deposits of households and resident non-financial corporations rose by 2.9%, or CZK 70 billion, in 2014 (see Chart III.13). The deposits of households increased by 3.1% despite a decline in average interest rates of 0.16 pp to 0.78%. Deposits of non-financial corporations increased by 2.4% and the average interest rate declined by 0.11 pp to 0.22%. The largest proportion of new deposits of households was received by large banks rather than small banks as had been the case in the previous two years. A large difference was observed in the interest rate offered on household deposits with medium-sized banks, as in 2013. An outflow of

23 The higher interest rate level reflects the higher level of risk of consumer credit, as mentioned in FSR 2012/2013, p. 34.
24 The simulation uses an econometric model that explains banks' net interest income by means of bank-specific variables and interest rates. The resulting sensitivity to interest rate changes makes it possible to assess the impact of selected scenarios on net interest income. The simulation is performed for large and medium-sized banks and building societies. Small banks are excluded from the simulation due to limited data availability. Given their currently low profitability, however, small banks are generally highly vulnerable.
25 Long-term rates are proxied by 10-year government bond yields and short-term rates by the 3-month interbank PRIBOR.

household deposits was recorded by building societies[26] for a second consecutive year, despite the fact that building societies offered the highest returns on deposits. Non-financial corporations reduced their deposits with foreign bank branches.

Banks are further increasing their liquidity buffer…

The banking sector has long had a good liquidity position with a sizeable excess of client deposits over client loans. However, loans grew faster than deposits in 2014 and ratio of deposits to loans therefore dropped by 2.5 pp to 128% (see Chart III.14). Most client deposits (88%) and loans (81%) continue to be denominated in Czech koruna. Despite the decrease in the excess of deposits over loans, the quick assets ratio improved to 31%. This was due mainly to an increase of 26% in government bonds held to maturity in Czech banks' balance sheets. This liquidity buffer, which domestic banks can use in the event of a liquidity shock (see section 3.3), including to ensure compliance with the new CRR liquidity rules (see section 4.2), leaves sufficient room for the development of lending activity.

… building societies are constantly depositing liquidity in their bank groups

Building societies traditionally have a smaller liquidity buffer (see Chart III.15). Their quick assets ratio rose by 0.3 pp year on year and has been hovering around 17% since 2011. Their smaller liquidity buffer compared to the other segments of the banking sector stems from the configuration of the building savings system. Building societies deposit their excess liquidity with their domestic parent banks in the form of deposits with long maturities. This is possible because they form regulated consolidated groups with their parent banks, to which no caps on mutual exposures are applied.

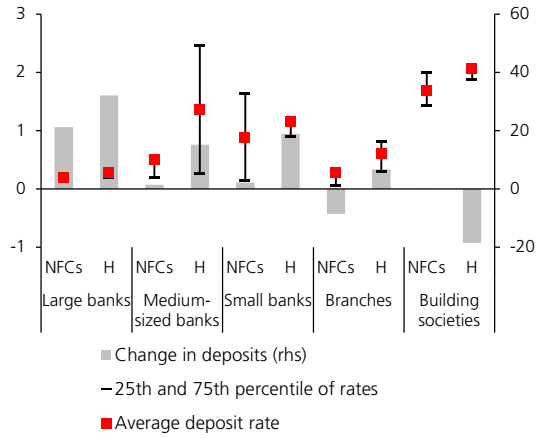
Banking groups are also active in other areas of financial intermediation, thereby increasing the complexity of financial intermediation…

Domestic banking groups not only operate in the banking business and, via their subsidiaries, in the building society business, but also in some cases form quite large consolidated groups subject to consolidated supervision. They are involved in activities in less regulated sectors (e.g. non-bank lenders and financial leasing), thereby contributing to the interconnectedness of the financial sector and increasing the complexity of the sector and the structural component of systemic risk. This may limit effective and timely identification of risks associated with credit interconnectedness and intra-group liquidity spillovers and heighten the risk of reputational contagion.

26 The decline in the deposits of building societies may be linked with the 2011 reduction in the annual state support provided for building savings schemes and with the general move away from time deposits.

CHART III.13

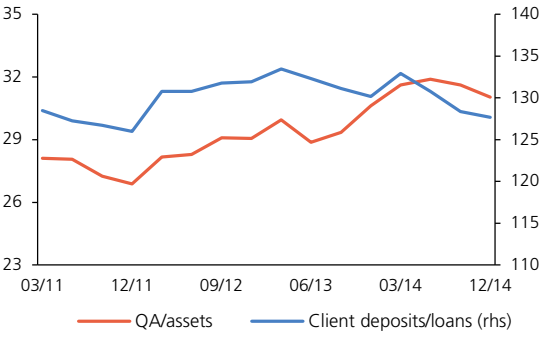
Change in household deposits in 2014 and average interest rates
(rates in %; deposits of residents in CZK billions)



Source: CNB
Note: Bank size classification by asset size as of 30 June 2014. NFCs = non-financial corporations; H = total households. NFCs' deposits at building societies are deposits of housing cooperatives and owners' associations. NFCs' deposits account for less than 0.5% of total building society deposits.

CHART III.14

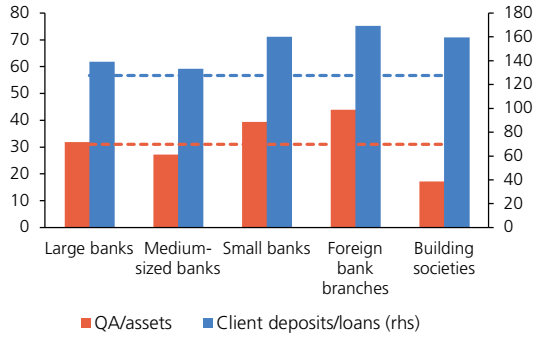
Liquidity ratios over time
(%)



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

CHART III.15

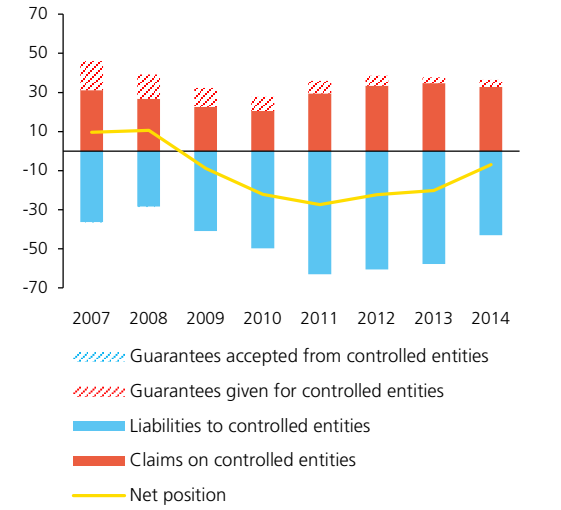
Liquidity situation in the banking sector
(%; as of December 2014)



Source: CNB
Note: QA = quick assets. The value for medium-sized banks excludes Hypoteční banka and the Czech Export Bank owing to their specific funding models. The dashed lines denote values for the banking sector. The ratio of deposits to loans covers both residents and non-residents.

CHART III.16

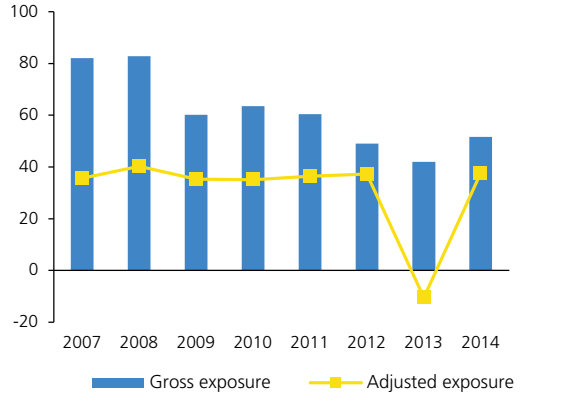
Credit interconnectedness in domestic bank groups
(as % of regulatory capital of domestic parent banks)



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

CHART III.17

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



Source: CNB
Note: The chart shows the aggregate exposure of the five largest banks in the Czech Republic, which have foreign parents in the euro area. Gross exposure consists mainly of claims in the form of loans provided to the parent group and claims arising from derivatives transactions and other off-balance-sheet items in the investment and trading portfolios. Adjusted exposure = gross exposure minus liabilities in the form of deposits and loans accepted from foreign parent banks. The values in the chart do not reflect any collateralization.

… but credit interconnectedness in domestic bank groups is little changed

The largest domestic banks saw a decline in liabilities to the entities they control. Banks' net debtor position fell by CZK 13 billion to just CZK 7 billion at the end of 2014 (see Chart III.16). Domestic parent banks are in a debtor position mainly vis-à-vis building societies that are members of their groups. These liabilities accounted for 83% of parent banks' total liabilities to all controlled entities, representing a slight year-on-year decline. Parent banks are lenders to non-bank financial corporations engaged in lending (NFCELs), which include leasing, consumer financing and factoring services companies. Claims on these companies account for 90% of total claims on all controlled entities. This share rose by 2 pp year on year. Intra-group claims on NFCELs are usually one of banks' largest exposures. The volume of, and growth in, credit interconnectedness indicates that the structural component of systemic risk has been shrinking over recent years.

The largest domestic banks returned to being net creditors of their parent groups…

Following a decline in previous years, the gross exposure of the five largest domestic banks to their foreign parent banks increased in 2014. Gross exposure increased by 9.6 pp to 51.6% of regulatory capital (see Chart III.17). However, there are significant differences across banks, and the ratio for one of the monitored banks exceeded 100% of regulatory capital. Adjusted exposure, which takes into account some liabilities of domestic banks to their parent banks, turned positive at the end of 2014. The effect of the November 2013 foreign exchange interventions, which were associated with demand among domestic banks for euro, has thus dropped out.

… and the banking sector's net position vis-à-vis foreign entities remains slightly positive

The high volume of residents' deposits ensures that the domestic banking sector as a whole is independent of foreign sources of funding. Its net external position – the difference between foreign claims and foreign liabilities – has thus long been positive. However, it started to decline gradually in 2013 and stood at CZK 54 billion at the end of 2014.

Credit unions remain risky…

The total assets of active credit unions rose further in 2014. Although one credit union had its licence revoked in this period, the assets of the rest increased by 15.2% year on year to CZK 31 billion. Year-on-year growth in deposits, which account for the bulk of credit unions' liabilities, amounted to 17.4%. The risk indicators of the credit union segment were mixed in 2014. The NPL ratio worsened further. It rose by 4 pp to 29.9%, remaining many times higher than that of banks (see Table III.2). RoE also remains low, despite having risen to 2.2% year on year. However, the level of this indicator is very mixed across credit unions. The ratio of the five largest loans to capital improved slightly, falling by 3 pp to 90%. NPL coverage by provisions also rose slightly.

… but legislation has been passed which tightens the prudential rules applying to their operations

In previous years, the inadequate legislative framework applying to the operations of credit unions led to efforts to tighten the regulatory conditions. As a result, Act No. 333/2014 Coll., tightening some prudential rules, was passed in 2014. Among other things, the act introduces a future cap on a credit union's balance-sheet total, limits the size of individual loans provided and increases credit unions' contribution to the Deposit Insurance Fund. A 1:10 rule for the ratio of the membership deposit to remunerated deposits is also being introduced. This measure is aimed at reinforcing the cooperative principle and encouraging depositors to get actively involved in the credit union's management.

Most insurance companies are maintaining stable profitability, but the sector's performance was negatively affected by developments abroad

The non-life insurance segment continued to grow in 2014. This growth took the form of an increase in gross premiums written and a decline in gross claim settlement costs (see Chart III.18). However, the technical account for non-life insurance recorded an overall decline due to increased creation of insurance reserves for risks to foreign commercial transactions in credit insurance.

The low interest rate environment is affecting insurance companies' performance…

Claim settlement costs in life insurance continued to rise (due mainly to policies maturing), while premiums written stayed at roughly the previous year's level. However, the overall result in this segment was offset by a slight increase in returns on financial placement (investment) and remains comparable with previous years' results. The increase in returns on financial placement was a result of a significant year-on-year decrease in the yield curve and related revaluation of the bond portfolio. However, the extremely low level and flattening out of the yield curve are negatively affecting financial results in the life insurance segment. The size of this risk depends on the difference between the returns on financial placement and the guaranteed returns on insurance products (the technical interest rate, TIR), on the differences between the maturity profiles of assets and liabilities, and on the product structure of each insurance company,

… and is leading insurance companies to seek alternative business models

The average duration of insurance companies' assets was around 4.8 years at the end of 2013, while the duration of insurance liabilities was around 5.4 years. Simply put, this means that liabilities are more sensitive to interest rate risk than claims are. For some insurance companies this sensitivity is well above the sector average. The difference in the yields on safe assets and the TIR is illustrated by Chart III.19. It shows that the yield on long-term government bonds, which Czech insurance companies typically invest in, was well below the rate of return guaranteed by the average Czech insurance company in a traditional life

TABLE III.2

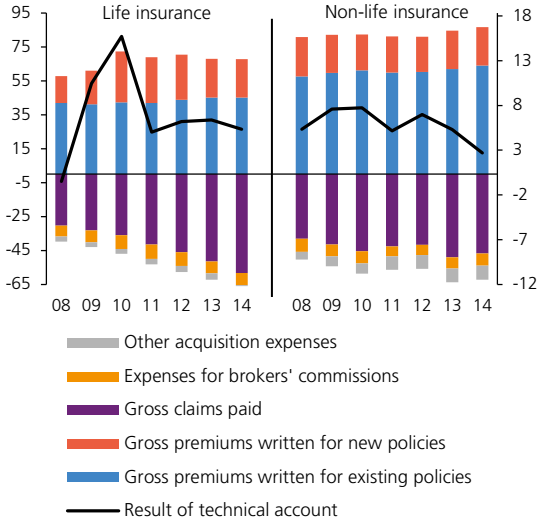
Selected indicators of credit unions as compared to banks
(%; end-2013 and end-2014 data; credit unions active as of 31 December 2014)

	2013		2014	
	Credit unions	Banks	Credit unions	Banks
Average interest rate on client loans (1)	7.8	4.0	8.3	3.9
Average interest rate on client deposits (2)	2.8	0.8	2.4	0.7
Interest margin (1)–(2)	5.0	3.2	5.9	3.2
Client deposits/loans (excluding general government)	118.2	114.6	131.0	115.7
Client NPL ratio	25.3	6.1	29.9	6.3
Quick assets/total assets	17.4	30.7	23.8	31.0
Coverage of NPLs with provisions	16.1	51.6	18.4	47.8
Tier 1 CAR	12.4	16.5	12.8	17.3
RoE	-0.1	17.1	2.2	16.6
RoA	0.0	1.2	0.2	1.2
Share of sector in client loans	0.7	99.3	0.7	99.3
Share of sector in client deposits	0.8	99.2	0.8	99.2

Source: CNB
Note: The year-on-year comparison excludes WPB Capital, spořitelní družstvo, whose licence was revoked in June 2014. The accounting period is not unified across the credit union segment, so the relevant data were annualised for some institutions.

CHART III.18

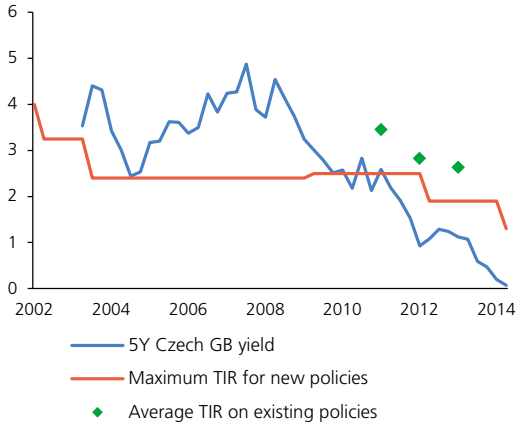
Key financial indicators for the insurance sector
(CZK billions)



Source: CNB

CHART III.19

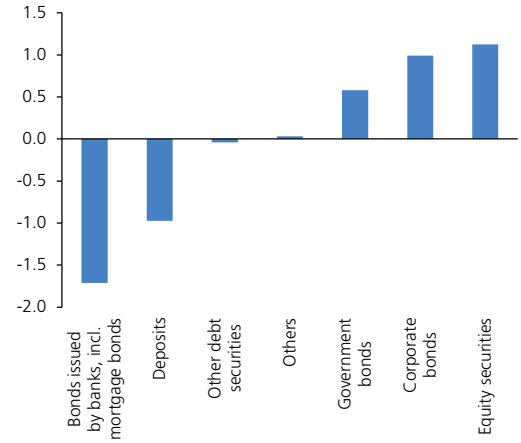
Technical interest rate and Czech government bond yields
(%)



Source: CNB
Note: Average TIR data from a sample of 11 insurance companies taking part in joint stress tests.

CHART III.20

Changes in financial placement for coverage of life insurance (excluding investment life insurance)
(pp; change between 31 December 2011 and 31 December 2014)



Source: CNB
Note: The government bond category contains government bonds issued by OECD member states and by the EIB, the ECB, the EBRD and the IBRD.

insurance policy in past years. A widening of this gap is constrained by regulation of the maximum TIR for new policies. However, even this limit has been well above the yield on Czech government bonds since 2012. In accordance with the regulations, some insurers thus had to set aside additional reserves to cover liabilities arising from contracts for traditional life insurance products. Generally, this environment is causing insurance companies to make significant changes to their insurance product ranges and investment strategies. Although the investment strategies of domestic insurance companies remain relatively conservative (with investment in Czech government bonds playing the main role), an increase can be seen in the shares of more profitable types of assets, such as bonds issued by non-financial corporations, equity securities and real estate (see Chart III.20). Some diversification can also be seen in the government bond portfolio, as the share of exposures to countries other than the Czech Republic is on the rise (9.2% at the end of last year, as compared to 6.4% at the end of 2012).

On the liability side, insurance companies are adjusting to the environment of sustained low interest rates most frequently by lowering the TIR and changing the structure of their product ranges. They are reducing the supply of traditional insurance products with long-term guaranteed returns and focusing more on products with declared guarantees and unit-linked investment life insurance products. The share of investment life insurance (as a percentage of financial placement) has risen from 14% in 2011 to around 17% at present.

In addition to financial market developments, regulatory changes will play an important role

Until the end of this year, insurance companies have the option of valuing high-quality government bonds (with the same or higher rating than the Czech Republic) held to maturity at amortised cost under the Solvency I rules. However, in 2016, when Solvency II takes effect, this option will be abolished for regulatory purposes. As a result of market revaluation, the performance of some insurance companies could be affected by excessive volatility in financial markets. Therefore, the approved European implementation of the new rules contains measures to reduce sensitivity to some market risks, known collectively as the "Long-Term Guarantee Package". These measures include matching adjustment and volatility adjustment. The former enables selected portfolios of liabilities and assigned asset portfolios that comply with prescribed expected cash flow criteria to be excluded from market revaluation. The latter enables the risk-free yield curve to be adjusted for part of the difference between the yield of the curve used and the return on a reference portfolio containing a wider range of financial assets. The adjusted curve and the original risk-free curve are calculated and published monthly by the European Insurance and Occupational Pension Authority (EIOPA). Despite these measures, domestic insurance corporations will have to improve their asset and liability management processes, strengthen their risk management systems and assess risks over the medium term.

The pension management companies sector has undergone legislative changes and is continuing to expand

The pension management companies sector was affected by legislative changes. In 2014, it was decided to abolish the second pillar (retirement funds) with effect from 2016. In addition to the state pension in the first pillar, the option of voluntary saving in transformed and participation[27] funds under the third pillar remains in place. Although no new participants may join transformed funds by law and the number of members is steadily falling, these funds' total assets increased by 12.4% year on year to CZK 333 billion. The balance of contributions and benefits fell by 15% year on year to CZK 32 billion (see Chart III.21), with a rise in expenditure on lump-sum settlements being accompanied by a slight decrease in planholders' contributions. Participation funds were established in 2013 and their total assets of CZK 4.9 billion, which increased by 288% year on year, currently constitute a marginal part of the sector. In line with their nature, participation funds (with the exception of conservative funds) have a riskier balance-sheet structure than transformed funds (see Chart III.22).

Investment funds recorded a significant inflow of new funds…

The total assets of investment funds increased by 19% year on year to CZK 291 billion at the end of 2014. Collective investment funds, which invest money collected from the public, accounted for approximately 60% of this amount. As in 2013, the largest inflow of funds among collective investment funds was recorded by mixed funds, whose portfolios are made up of shares, bonds and money market instruments (see Chart III.23).

… so households are more exposed to new risks

More than 50% of the liabilities of all investment funds are liabilities to the household sector. At the end of 2014, these liabilities amounted to CZK 154 billion (see Chart III.24). Following a fall in the total assets of investment funds in 2008, households' exposure to investment funds accounted for less than 4% of their net assets. However, this share has been rising over the last three years and stood at just below 5% at the end of 2014. Households are thus increasing the proportion of their wealth deposited in higher-yield, but riskier assets in the form of investment fund units.

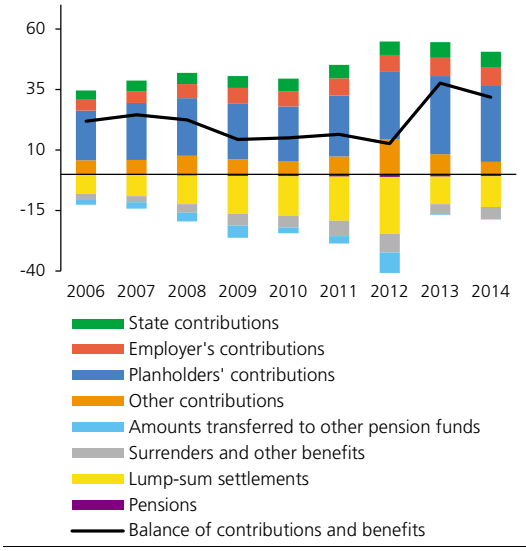
The position of non-bank intermediaries was little changed

Total loans provided by non-bank financial corporations engaged in lending (NFCELs) rose slightly to CZK 247.5 billion in 2014 (see Chart III.25). Loans to non-financial corporations increased by CZK 6 billion, while loans to households for consumption rose by just CZK 2.7 billion. The market shares of NFCELs in loans to non-financial corporations and

27 Transformed funds were established by conversion from pension funds under the 2013 pension reform. Entry to these funds was conditional on establishing a private pension policy until 1 December 2012. In contrast to transformed funds, saving in participation funds is not conditional on the date of conclusion of the contract and offers investment strategies of various degrees of risk.

CHART III.21

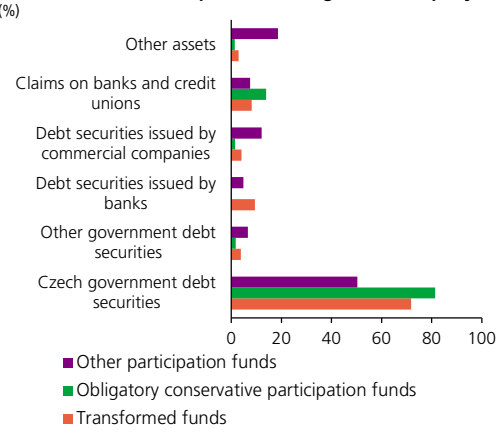
Pension fund contributions and benefits
(CZK billions)



Source: CNB

CHART III.22

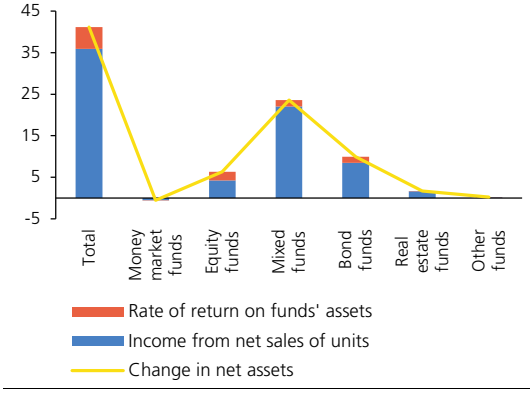
Placement of assets of pension management company funds
(%)



Source: CNB

CHART III.23

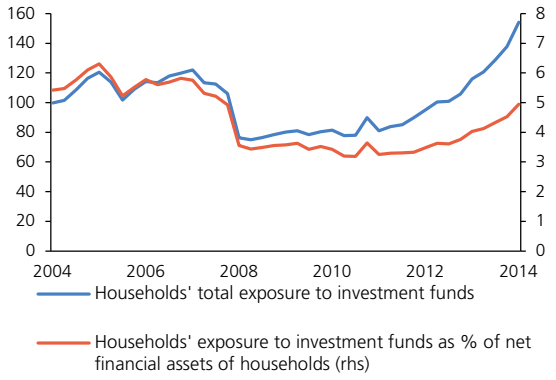
Decomposition of changes in the net assets of open-ended mutual funds intended for the public
(CZK billions; for 2014)



Source: CNB

CHART III.24

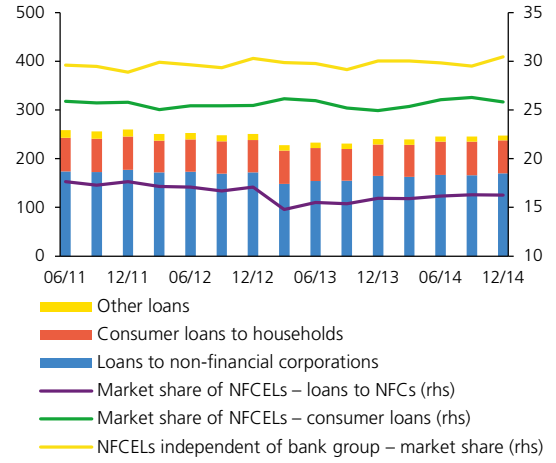
Households' exposure to investment funds
(CZK billions; right-hand scale in %)



Source: CNB

CHART III.25

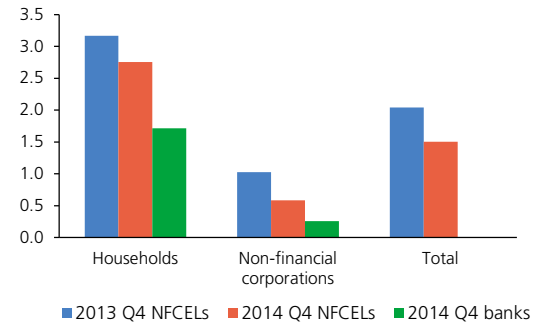
Loans provided by non-bank financial corporations engaged in lending
(stock of loans in CZK billions; right-hand scale in %)



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.26

3M default rate on loans provided by credit institutions
(%)



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

consumer loans to households in the Czech Republic remained stable and stood at 16.3% and 25.8% respectively at the end of the year. According to figures from the Czech Leasing and Finance Association, there is increasing interest in operational leasing[28] for households. However, the amount of financing provided in this way by the association's members remained negligible in 2014 (CZK 2 billion). The share of loans to business borrowers financed through operational leasing on total volume of leasing decreased slightly to 40.7%. According to data from the Banking Client Information Register and from the credit register of natural persons maintained by the SOLUS association, credit risk in NFCEL balance sheets declined in 2014 (see Chart III.26). However, it remains higher than that of banks.

28 Operational leasing allows a movable or immovable item to be used, but unlike in the case of financial leasing there is no transfer of the substantial risks and benefits associated with ownership of the asset. Operational leasing is therefore de facto renting and is not included in the CNB's financial intermediation statistics.

3.2 SOLVENCY STRESS TESTS OF BANKS, INSURANCE COMPANIES AND PENSION MANAGEMENT COMPANIES

The stress tests demonstrate that the banking sector is highly resilient to selected adverse scenarios. Banks have a large capital buffer enabling them to absorb adverse shocks and maintain their overall capital ratio sufficiently above the regulatory threshold of 8% even in a very adverse scenario. The insurance company sector also showed sufficient resilience to an adverse scenario thanks to its large capital buffer. The pension management company sector is sensitive to interest rate volatility, and a rise in koruna rates could adversely affect its profitability and solvency in some circumstances.

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

The resilience of banks, insurance companies and pension management companies was tested in macro stress tests using a *Baseline Scenario* for the most probable future developments and a hypothetical *Adverse Scenario*, representing a strong and persistent decline in economic activity in the Czech Republic, accompanied by a fall of the economy into deflation (see section 2.1). The developments represented by the adverse scenario are extended to include other sensitivity analyses that amplify the shocks' impacts and illustrate the sectors' resilience to relevant risks.

The bank stress test methodology is regularly updated

The stress tests saw no major methodological changes. As usual, the test parameters were refined using satellite models, which were re-estimated using the most recent time series. As in the previous Report, the banking sector tests were performed on end-Q1 data.[29] The tests are newly based on reports from the COREP and FINREP single European reporting frameworks. The stress tests of insurance companies and pension management companies were performed on end-2014 data.

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

Stress tests are traditionally one of the most important tools for assessing the resilience of the banking sector to potential risks to the stability of the Czech financial sector. Particular attention is paid to credit risk, which is the largest risk in the Czech banking sector. The evolution of credit risk is closely linked with developments in the household and corporate sectors. The economic recovery is reflected in a greater ability of households and corporations to repay their debts, i.e. a lower level of credit risk (see sections 2.2 and 2.3). The default rate, a key indicator of credit risk, remains at historical lows in the *Baseline Scenario* in both the non-financial corporations and household sectors (see Table III.3). The long-standing environment of low interest rates reduces banks' traditional interest income (see Box 3 in section 3.1). Given the expected interest rate developments, the *Baseline Scenario* expects banks' adjusted

TABLE III.3

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

	Actual value	*Baseline Scenario*			*Adverse Scenario*		
	2014	2015	2016	2017	2015	2016	2017
Macroeconomic variables							
GDP (y-o-y %)	2.0	2.6	3.2	3.5	-0.9	-3.7	-2.8
Inflation (%)	0.4	0.2	1.7	1.9	-0.4	-2.1	-2.6
Unemployment (%)	6.2	5.4	5.0	4.4	5.6	7.0	9.1
Nominal wage growth (%)	2.2	2.3	4.2	5.0	-1.5	-7.4	-3.3
Effective GDP growth in euro area (%)	1.1	1.8	2.2	2.0	-0.1	-0.6	-0.4
Credit growth (%)							
Total	5.1	6.0	7.0	7.9	2.5	-5.0	-8.3
Corporations	1.1	3.8	4.8	5.4	0.6	-4.3	-5.8
Households	4.8	5.1	5.7	6.2	2.6	-1.8	-4.5
Default rate (PD, %)							
Corporations	1.7	1.5	1.5	1.5	4.0	5.3	5.5
Loans for house purchase	2.8	2.6	2.4	2.3	5.1	6.2	6.5
Consumer credit	6.7	6.4	6.5	6.5	8.7	10.1	10.8
Loss given default (LGD, %)							
Corporations	45.0	45.0	45.0	45.0	51.9	58.9	57.6
Loans for house purchase	22.0	22.0	22.0	22.0	25.6	37.9	46.3
Consumer credit	55.0	55.0	55.0	55.0	60.2	64.4	71.8
Asset markets (%)							
3M PRIBOR	0.4	0.3	0.3	1.1	0.3	0.3	0.3
5Y yield	0.5	0.1	0.1	1.5	2.4	3.9	4.0
3M EURIBOR	0.2	0.0	0.0	0.1	0.0	0.0	0.0
5Y EUR yield	0.3	0.0	0.0	0.0	1.3	2.4	2.4
Change in residential property prices	2.2	4.1	5.0	6.2	0.0	-8.1	-9.0
Change in share prices	-4.3		-5.0			-30.0	
Banks' earnings							
Adjusted operating profit (y-o-y %)	-1.1	-2.0	-2.0	0.0	-13.7	-20.3	-19.4

Source: CNB, CNB calculation, BRCI

29 Data on capital ratios were unavailable at the time of the testing, so end-2014 capital values were used.

TABLE III.4

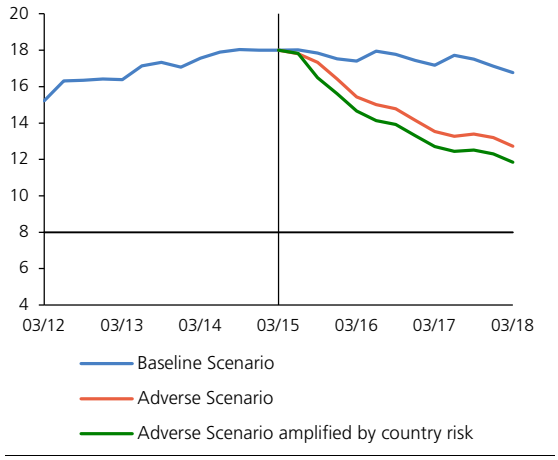
Impact of the alternative scenarios on the banking sector

	Baseline Scenario			*Adverse Scenario*		
	2015	2016	2017	2015	2016	2017
Expected credit losses (minus sign for losses)						
CZK billions	-19.3	-24.7	-25.9	-42.6	-74.4	-78.8
% of assets	-0.3	-0.4	-0.4	-0.8	-1.4	-1.6
Profit/loss from market risks						
CZK billions	5.1	-0.9	-14.7	-24.1	-2.4	-0.3
% of assets	0.1	0.0	-0.2	-0.4	0.0	0.0
Earnings for covering losses (adjusted operating profit)						
CZK billions	74.4	72.9	73.0	65.5	52.2	42.1
% of assets	1.3	1.3	1.2	1.2	1.0	0.8
Pre-tax profit/loss						
CZK billions	60.2	47.3	32.4	-1.5	-25.4	-37.1
% of assets	1.1	0.8	0.5	0.0	-0.5	-0.7
Capital ratio at end of period in %						
Total	**17.5**	**17.4**	**17.1**	**16.4**	**14.2**	**13.2**
Tier 1	**17.1**	**17.0**	**16.7**	**16.0**	**13.8**	**12.8**
Capital injections						
CZK billions		0.7			9.0	
% of GDP		0.02			0.2	
No. of banks below 8% capital ratio		3			10	

Source: CNB, CNB calculation

CHART III.27

Capital ratios depending on scenarios



Source: CNB, CNB calculation

operating profit to continue to trend downwards by around 2% a year in 2015 and 2016.[30]

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

Despite the worse profitability outlook, the banking sector remains resilient over the entire three-year test horizon and has sufficient capital reserves. The sector's aggregate capital ratio is around 17%, i.e. well above the regulatory minimum of 8%. The Tier 1 capital ratio is only about 0.4 pp below the total capital ratio, illustrating high quality of the capital structure. Nevertheless, three banks (which, however, represent only around 1.5% of the sector's assets) get into a situation of insufficient capital adequacy in the *Baseline Scenario*, implying an adjustment of their business models or a need to top up their capital in the future.[31]

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

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

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

Despite these adverse developments, the capital ratio of the banking sector does not drop below 12.5% in the *Adverse Scenario* (see Chart III.27). Although the aggregate capital ratio stays sufficiently above 8%, ten banks – representing about 12% of the sector's assets – record a fall in capital adequacy below the regulatory minimum and have to top

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

31 Banks may also get into a situation of an insufficient capital ratio because the stress test methodology assesses their business model as unsustainable in the longer run. However, this methodology is based on a universal bank model and may not be entirely accurate for specialised banking institutions. The CNB therefore takes into account institutions' specific characteristics when assessing the test results.

up their capital. The necessary capital injections total around CZK 9 billion, i.e. around 0.2% of GDP (see Table III.4, column 2). Relative to the size of the banking sector, this figure is not significant enough to jeopardise its stability. The banking sector's stability is based on its high capital ratio, which went up by a further 0.9 pp compared to the previous year, and on its ability to generate income to cover losses even in the event of highly adverse developments.

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

A decomposition of the change in the capital ratio clearly illustrates the impacts of the main factors underlying the evolution of the capital ratio in the stress tests. In the *Baseline Scenario*, the Czech banking sector's income increases the capital ratio by 10.7 pp over the test horizon.[32] Part of this income is used to cover expected credit and market losses (-3.5 pp) and to pay dividends and taxes (-4.7 pp).[33] The recovery in economic activity leads to a rise in banks' exposures, lowering the capital ratio by 2.8 pp. A change in risk weights due to a change in the structure of lending reduces the capital ratio by a further 1 pp to 16.8% at the end of the three-year test horizon (see Chart III.28).[34]

Even in the *Adverse Scenario*, banks are able to generate income to cover their losses (+9.6 pp). However, this income is not sufficient to cover all the expected losses over the test horizon (-10 pp). Dividends and taxes, paid above all from profits for 2014, make a negative contribution to the capital ratio of 1.7 pp. Banks then react to the worse situation by lowering the volume of loans, which reduces the decline by 1.9 pp. The deterioration of the economic environment and the materialisation of credit risk increase the risk weights, fostering a marked drop in the banking sector's capital ratio of 5 pp to 12.7% in the final period of the test (see Chart III.29).

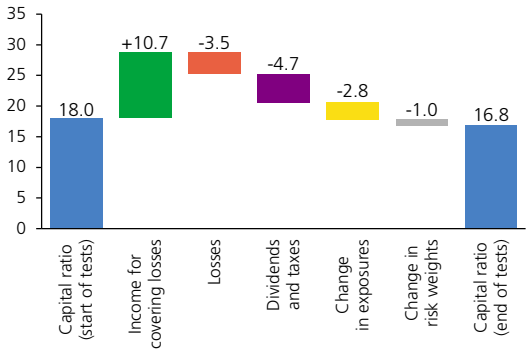
An additional sensitivity analysis in the *Adverse Scenario* assesses the impacts of partial impairment of exposures to indebted countries

Within the *Adverse Scenario*, a sensitivity analysis is performed assuming partial impairment of all domestic banks' exposures to EU countries with debt exceeding 60% of GDP. Some haircut on exposures is already assumed in the *Adverse Scenario* through a decline in the value of government bonds of EU countries, including the Czech Republic, due to growth in their yields. To this baseline haircut the additional sensitivity analysis adds haircuts on all domestic banks' exposures to indebted countries based on figures derived from those countries' average ratings

CHART III.28

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

(%)

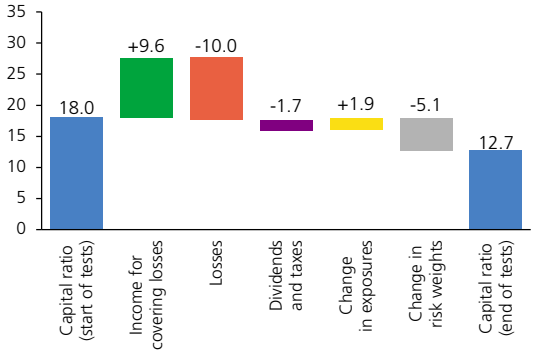


Source: CNB, CNB calculation

CHART III.29

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

(%)



Source: CNB, CNB calculation

32 The income used to cover losses includes profits for 2014 and expected income in 2015 and 2016.

33 The stress tests assume that banks that generate a profit in the previous financial year decide about its distribution in the second quarter of the following year. The amount of dividends paid depends on the difference between the actual capital ratio in the given quarter and the targeted capital ratio.

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

TABLE III.5

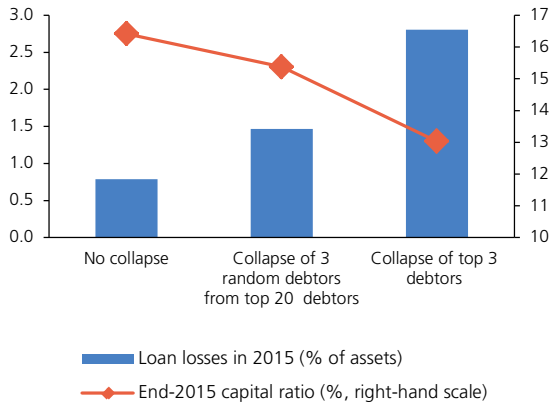
Haircuts on EU countries' exposures
(%)

Country	Haircut
Austria	2
Belgium	7
Croatia	32
Cyprus	43
France	5
Germany	0
Greece	49
Hungary	30
Ireland	18
Italy	24
Malta	18
Netherlands	1
Portugal	31
Slovenia	22
Spain	23
United Kingdom	2

Source: Rating agencies, CNB calculation
Note: The haircuts are calculated using the main agencies' ratings as of May 2015 for EU countries with debt exceeding 60% of GDP.

CHART III.30

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



Source: CNB, CNB calculation

(see Table III.5). This assumption generates additional losses of CZK 27 billion for the banking sector. The sector's capital ratio remains above 11.5% over the test horizon (see Chart III.27, *Adverse Scenario* amplified by country risk), while the capital injections increase to almost CZK 18 billion (around 0.4% of GDP).

The portfolio concentration test represents a strong shock…

The final sensitivity analysis in the *Adverse Scenario* focuses on testing concentration risk assuming default by the largest debtors of each bank. Although the concentration of client loan exposures (as measured by the share of the three largest exposures in the portfolio of loans to legal entities) has long been relatively constant at around 13%, the largest loans may not be sufficiently collateralised in some cases. This is evidenced by the fact that the share of uncollateralised loans in loans to the top three debtors was 59% at the end of 2014.[35] If these debtors default, banks' credit losses could reach high levels.

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

The concentration test is performed in two variants. The first assumes the collapse of three random debtors from the top 20 debtors of each bank. The other, stricter, one assumes the collapse of the top three debtors of each bank. Given the above share of uncollateralised loans in loans to the largest clients, a 50% haircut on these exposures is considered in both cases. This shock has a big effect on the banking sector's credit losses and capital ratio. The capital ratio falls to 15% at the end of 2015 for the collapse of three random large debtors. The collapse of the top three debtors of each bank would cause an even sharper fall in the capital ratio, to 13% (see Chart III.30). The concentration test represents a very strong stress scenario, and the resulting banking sector capital ratio based on such a large shock can therefore be assessed as positive.

BOX 4: AGGREGATE RESULTS OF JOINT (BOTTOM-UP) STRESS TESTING BY THE CNB AND SELECTED BANKS

In addition to top-down macro stress tests of the banking sector, the CNB has been performing bottom-up micro stress tests in partnership with selected Czech banks since 2009. Such testing was performed in 2014 for the largest EU banks in a comprehensive check by the ECB and the EBA. The micro stress tests differ from the macro stress tests mainly in that the impacts of shocks on banks' capital ratios are calculated by the banks themselves based on their own portfolios. They thus use much more detailed portfolio information than that available to the CNB for its macro stress tests. However, it is the CNB that defines the

35 The share of uncollateralised claims to non-financial corporations in loans to the five largest borrowers was 53% at the end of 2013.

most probable and adverse scenarios in both types of test.

The nine largest domestic banks, representing 73% of the assets of the Czech banking sector, took part in the eleventh round of micro stress tests using end-2014 data.[36] The focus was on testing credit risk, which is the largest risk for the Czech banking sector. In 2014 the micro stress tests were extended to include testing of key market risks. Therefore, they now include a sensitivity analysis of interest rate risk for the bank's entire portfolio and specific interest rate risk for domestic government bonds.

Since the micro stress test scenarios are prepared one quarter before the macro stress tests presented in this Report and the horizon of the micro stress tests is only one year, the scenarios and results of the two tests are not fully comparable. The baseline scenario for the micro stress tests (*Baseline*) is based on the CNB's macroeconomic forecast published in Inflation Report I/2015 and assumes a similar growth rate of the Czech economy as this Report's *Baseline Scenario*. Compared to the *Baseline Scenario* in this Report, the stress scenario for the micro stress tests (*Adverse*) assumes a sharper fall in economic activity in the first year and a more moderate decrease in the following years, which lie beyond the test horizon (see Chart III.13 Box).

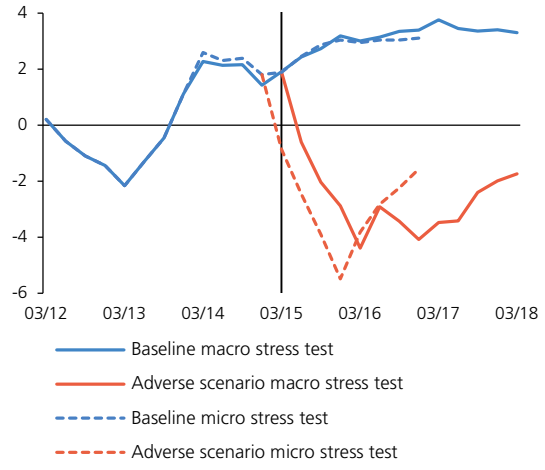
The macroeconomic developments assumed in the *Baseline* and *Adverse* scenarios determine the evolution of the credit risk parameters. As the micro stress tests are calculated for a one-year horizon, faster transmission of credit risks to banks' balance sheets is assumed than in the macro stress tests. A slight rise in credit risk for both corporate exposures and retail portfolios can be observed for the *Baseline* scenario one year ahead. Much higher credit risk is visible in the *Adverse* scenario, in line with the adverse evolution of economic activity. This is expressed by a broad rise in both the probability of default (PD) and the loss given default (LGD) in all the credit segments tested except central government, for which the PD remains at zero (see Table III.2 Box).

The results of the micro stress tests for the *Baseline* scenario point to a slight rise in the capital requirements of banks and a fall in annual profit of 10%. The aggregate Tier 1 capital ratio of the banks tested would remain unchanged at 18.2%. In the *Adverse* scenario the capital requirements rise by a significant 52.2% and profit declines by more than 42% overall. Despite these adverse developments, the aggregate Tier 1 capital ratio of the institutions

36 Banks were selected according to whether they have received approval to use the IRB approach for calculating the capital requirement for credit risk.

CHART III.13 BOX

Differences in the evolution of real GDP
(%)



Source: CNB

TABLE III.2 BOX

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

	Baseline 31 Dec. 2014		31 Dec. 2015		*Adverse* 31 Dec. 2015	
	PD	LGD	PD	LGD	PD	LGD
Corporate exposures	1.6	36.4	1.7	36.8	3.6	45.7
- large enterprises	0.9	37.1	1.0	37.1	2.1	46.7
- small and medium-sized enterprises	2.3	34.7	2.3	34.8	5.0	43.4
- specialised credit exposures	2.1	40.2	2.2	40.3	4.7	50.3
Retail exposures	1.9	23.3	2.1	23.6	3.1	31.2
- retail-assessed SMEs	5.0	37.8	4.8	36.7	10.4	46.3
- loans for house purchase	1.2	15.5	1.4	15.7	1.9	22.0
- other loans to individuals	3.4	44.7	3.8	44.8	4.9	56.5
Institutions	0.2	26.7	0.2	26.7	0.4	30.8
Central governments	0.0	10.2	0.0	10.2	0.0	15.1

Source: CNB

TABLE III.3 BOX

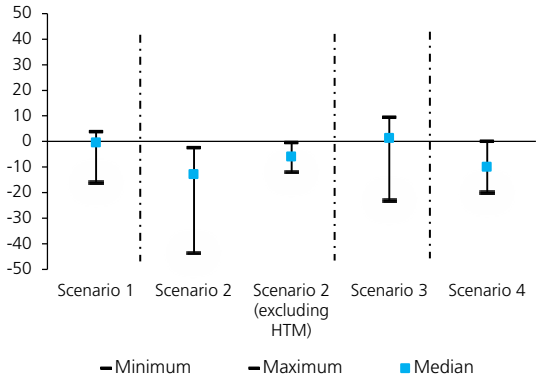
Banks' capital requirements and capital ratios
(%)

	31 Dec. 2014	*Baseline* 31 Dec.2015	*Adverse* 31 Dec. 2015
Capital requirements (year-on-year change)	-	4.4	52.2
Regulatory capital (year-on-year change)	-	5.4	-4.0
Tier 1 capital ratio	18.2	18.2	11.9
Capital ratio	18.5	18.6	12.1

Source: CNB

GRAF III.14 BOX

Interest rate risk sensitivity analyses
(as % of Tier 1 and Tier 2 regulatory capital)



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

tested remains well above the 8% threshold at the one-year horizon, dropping to 11.9% (see Table III.3 Box).

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

In addition to the *Baseline* and *Adverse* scenarios, a sensitivity analysis of general interest rate risk and the specific interest rate risk of CZK government bonds was performed. The economic logic of the test was applied in the interest rate risk testing, so the effect of accounting categories on the revaluation of bank assets and liabilities was suppressed. The sensitivity analysis covers the entire bank portfolio (the banking and trading books) and uses four scenarios. *Scenario 1* assumes a 3 pp parallel shift of the yield curve, *Scenario 2* assumes a 3 pp widening of the CZK government bond spread vis-à-vis the IRS yield curve, *Scenario 3* assumes a larger increase in the slope of the yield curve[37] and *Scenario 4* contains a combination of a more moderate increase in the slope of the yield curve and a 2 pp widening of the CZK government bond spread vis-à-vis the IRS yield curve.[38]

The results of the sensitivity analysis show that a rise in interest rates would have mixed impacts across the banks tested (see Chart III.14 Box). In *Scenario 1*, the impact of a parallel shift of the yield curve would be between -16.1% and 3.7 % of capital. In *Scenario 3*, banks' sensitivity to rotation of the yield curve increases further, with the impact on the capital of the banks most exposed to interest rate risk ranging from -23% to 9.4%. *Scenario 2* assumes a widening of the CZK government bond spread because of a rise in the yield demanded by investors. The strongly negative impact of this scenario is due to the significant exposure of domestic banks to Czech government bonds. However, if accounting principles are taken into consideration, moving away from a purely economic perspective, the impact of

37 A 5 pp shift was assumed for maturities of over 5 years, the curve was left unchanged for maturities of up to 3 months, and linear interpolation was used for the shift for maturities of over 3 months and up to 5 years.
38 Increase in the yield curve slope: A 3 pp shift was assumed for maturities of over 5 years, the curve was left unchanged for maturities of up to 3 months, and linear interpolation was used for the shift for maturities of over 3 months and up to 5 years. Widening of the CZK government bond spread: a 2 pp shift was assumed for maturities of over 5 years, and linear interpolation was used for the shift for maturities of over 3 months and up to 5 years.

the test is significantly smaller, since domestic banks hold almost half of domestic government bonds in the "held to maturity" accounting category and hence do not mark these debt securities to market. In *Scenario 4*, the impact is between -20.1% and 0%.

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

The stress tests of pension management companies (PMCs) focus on assessing the risks to the sector at the one-year horizon. Together with the *Baseline Scenario*, the sector's resilience to the *Adverse Scenario* was also tested; this variant captures adverse economic developments coupled with increased tensions in financial markets. The *Adverse Scenario* will manifest itself as sharp falls in the property and equity markets, depreciation of the exchange rate and a jump in yields on long-term Czech and foreign government bonds. In particular, a marked rise in bond yields could pose a significant risk given the portfolio structure of these institutions.

The PMC stress-testing methodology has been further refined

The PMC stress-testing methodology was refined in this year's tests. Given the significant share of koruna securities in the balance sheets of transformed funds, market revaluation of these instruments is now considered.[39] This implies a potential marked increase in stress compared to the stress tests performed in previous years. In addition, a price decline depending on credit quality and maturity is assumed for corporate and government securities in the *Adverse Scenario*. Regarding currency and interest rate risk, hedging applied by funds to reduce their exposure to these risks is considered in a more elaborate way. A key feature of the test is the transfer of stress from transformed funds[40] to the relevant PMCs. The law[41] stipulates that if the value of assets of transformed funds should fall below the value of liabilities,[42] the pension management company must top up the difference from its own funds. This amount is subtracted from the capital of the PMC.

Transformed funds are mainly sensitive to interest rate risk...

The effect of the considered risks on the results of transformed funds and PMCs is summarised in Table III.7. Interest rates, which affect the value of bond holdings, have the largest impact. While the overall effect of interest rate risk in the *Baseline Scenario* is positive owing to the decline in rates, assets fall in value by 5.9% in the *Adverse Scenario*, which

TAB. III.7

Results of the stress tests of PMCs

		Baseline Scenario	*Adverse Scenario*
Equity (as of beginning of period)	CZK billions	8.3	8.3
Capital ratio (as of beginning of period)	%	139.8	139.8
Change in asset value – interest rate risk	CZK billions	2.1	-19.5
	% of TF assets	0.6	-5.9
Change in asset value – exchange rate risk	CZK billions	0.0	0.2
	% of TF assets	0.0	0.0
Change in asset value – equity risk	CZK billions	-0.2	-1.4
	% of TF assets	-0.1	-0.4
Change in asset value – real estate risk	CZK billions	0.1	-0.1
	% of TF assets	0.0	0.0
Total impact of risks on TF assets	CZK billions	1.9	-20.8
	% of TF assets	0.6	-6.3
Profit of transformed funds	CZK billions	4.5	2.2
Equity (as of end of period)	CZK billions	9.0	1.3
Capital ratio (as of end of period)	%	151.2	22.5
Capital injection	CZK billions	0.0	4.6

Source: CNB, CNB calculation
Note: TF = transformed funds

39 With the exception of portfolios designated as held to maturity, which must not exceed 30% of assets according to the legislation in force.
40 The stress tests do not include retirement and participation funds, as the participants in these funds, not pension management companies, bear the entire investment risk. Moreover, the total assets of retirement and participation funds only account for 2% of this segment's assets.
41 Article 187(2) of Act No. 427/2011 Coll., on Supplementary Pension Savings.
42 In particular, the participants' savings inclusive of past returns and credited state support.

assumes a rise in rates. Funds holding a large proportion of their assets in fixed-rate koruna bonds with longer average residual maturities are hit the hardest. Exchange rate risk is hedged in all funds, so even a sizeable depreciation of the koruna has a minimal impact on fund assets. The effect of changes in equity and property prices is limited, as the share of such investments is small.

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

The change in the value of assets of transformed funds has only a minor impact on their accounting profit, as only some investments are realised in the given period. Therefore, assuming realisation of 10% of the potential profit or loss, the sizeable decrease in the value of assets in the *Adverse Scenario* does not preclude the generation of profit by transformed funds and non-zero returns for their participants.

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

As a result of the need to top up capital in transformed funds, the capital ratios of six out of the eight PMCs would fall below the required threshold in the *Adverse Scenario*. For three of them, it would cause their capital to turn negative. The owners would have to inject capital of CZK 4.6 billion in order to meet the capital ratio requirement. This represents 55% of the equity of the PMCs as at the end of 2014. When the value of the transformed fund assets rises again, the PMC may withdraw the funds. However, it is apparent that in the event of very unfavourable developments, the duty to top up resources in transformed funds represents a substantial burden on PMCs and their owners.

Portfolio sales in a situation of lower market liquidity could exacerbate the stress

The effect described above could be amplified in the event of mass sales of assets. Such sales would cause the already low market prices assumed in the *Adverse Scenario* to fall further. This drop in prices could be particularly significant in an environment of lower market liquidity (see section 2.1). This would lead to a downward spiral in the value of balance-sheet assets, a need for PMCs to top up resources again, and further capital injections from PMC owners.

BOX 5: AGGREGATE RESULTS OF JOINT (BOTTOM-UP) STRESS TESTING BY THE CNB AND SELECTED INSURANCE COMPANIES

A sixth round of joint stress testing by the CNB and selected insurance companies took place in April 2015. The aim of the test is to assess the ability of insurance companies to absorb the impacts of adverse economic developments. The test is repeated on an annual basis. The ten insurance companies participating this year accounted for around 91% of the domestic market in 2014 based on gross premiums written.

As Solvency II will take effect on 1 January 2016, the test methodology was changed compared to 2014 and the test was performed fully in line with Solvency II principles. According to the new regulation, insurance companies should have sufficient funds relative to the actual risks they face. Solvency II introduces different rules for the valuation of assets and liabilities. The main changes concern the valuation of technical provisions. Their value for regulatory purposes will be set as the discounted expected value of future cash flows from insurance contracts plus a risk margin. The change in technical provisions compared to Solvency I will lead to a rise in capital that can be used to cover risks. The method for setting the solvency capital requirement (SCR), which is based on the insurance company's risk profile, has changed substantially. The SCR represents the amount of capital that would cover unexpected large losses of the insurance company within a one-year time frame with a probability of 99.5%. The capital requirement set in this way under Solvency II is usually much higher than that under the previous regulation. In the context of these changes, the initial solvency ratio, i.e. the ratio of eligible capital to the SCR, was lowered significantly compared to last year's stress test. Under Solvency I, the initial solvency ratio as of 31 December 2013 before the application of the stress test had been 311%, with an available solvency margin of CZK 59.9 billion and a required solvency margin of CZK 19.2 billion. The initial solvency ratio under Solvency II as of 31 December 2014 was 212% and the eligible capital to cover the SCR of CZK 44 billion was CZK 93.1 billion. Eligible capital also takes into account expected dividend payments for 2014.

The stress test assesses the impact of significant changes in risk parameters on the value of the insurance company's assets and liabilities according to Solvency II valuation, and hence on the solvency position in accordance with the principles of Solvency II as of 31 December 2014. To make the stress test easier to process, no post-test recalculation of the SCR was required, so the change in the value of assets and liabilities in the test only affected the capital eligible to meet the SCR. As last year, the investment risks examined were equity risk, asset and liability interest rate risk, real estate risk, exchange rate risk, credit risk and the risk of a fall in government bond prices, and the non-life insurance risks tested were motor vehicle insurance premium risk and the risk of claims due to natural disasters. The stress testing scenario was derived from the adverse macroeconomic scenario that the CNB used to test the resilience of the banking sector, supplemented with risk factors relevant to insurance companies.[43]

TABLE III.4 BOX

Impact of the stress scenario

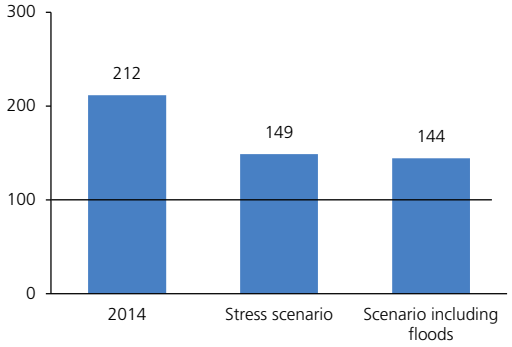
		Stress scenario including flood risk
Equity risk	CZK billions	-10.36
	% of assets	2.50
Real estate risk	CZK billions	-3.44
	% of assets	0.83
Exchange rate risk	CZK billions	-0.19
	% of assets	0.05
Interest rate risk	CZK billions	-7.06
	% of assets	1.70
Credit spread risk	CZK billions	-1.08
	% of assets	0.26
Risk of fall in GB prices	CZK billions	-8.31
	% of assets	2.01
Motor-vehicle insurance premium risk	CZK billions	-2.22
	% of assets	0.54
Risk of claims due to natural disasters	CZK billions	-2.43
	% of assets	0.59
Total impact of risks on available capital	CZK billions	-35.09
	% of assets	8.47
Other impacts (tax)	CZK billions	3.34
	% of assets	0.85
Available capital as of end of 2014	CZK billions	93.12
	% of assets	22.49
Available capital after application of test	CZK billions	63.47
	% of assets	15.33
Solvency ratio	2014	212%
	2015 (stress test)	144%

Source: CNB

43 We assumed a 41% drop in the value of shares, a 24% fall in property prices, a rise of about 2.5 pp in the risk-free curve, a decrease of 6.3% on average in government bond

CHART III.15 BOX

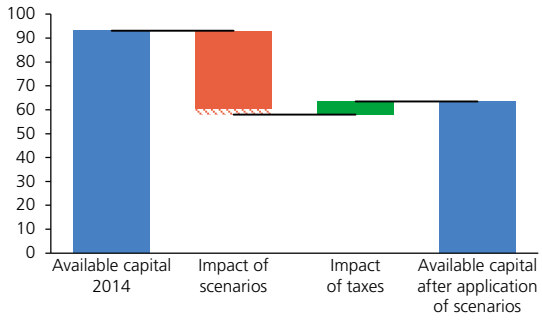
Solvency ratio for the stress scenario and the scenario including floods
(%)



Source: CNB

CHART III.16 BOX

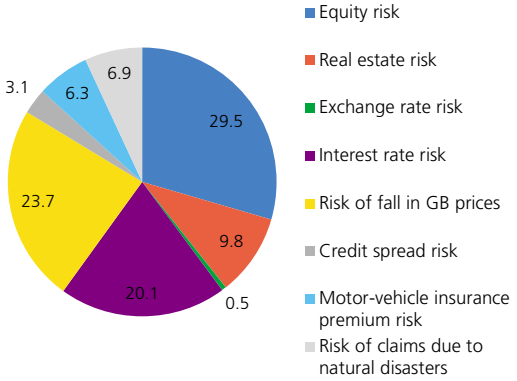
Change in available capital
(CZK billions)



Source: CNB
Note: In the "Impact of scenarios" column the impact of floods is indicated by hatching.

CHART III.17 BOX

Shares of individual risks in the decline in the available solvency margin caused by the shocks
(%)



Source: CNB

Furthermore, this scenario was extended to include a 10% decline in premiums written for motor vehicle insurance at the same level of costs as in 2014. The extended scenario also tested how insurance companies' capital would be affected in the event of simultaneous floods.

The aggregate results confirm that thanks to sufficient eligible capital, the sector as a whole, as represented by the participating insurance companies, would absorb the impacts of a large increase in risk factors, including simultaneous floods, even under the new Solvency II regulation (see Table III.4 Box and Chart III.15 Box). The sector would stay relatively high above the 100% solvency threshold even after the application of significant shocks (the solvency ratio would be 144%). The aggregate impact of the shocks on the level of capital available to meet the SCR (CZK 35.1 billion) in the test was lowered to take account of an income tax effect of CZK 3.3 billion (see Chart III.16 Box). In the scenario applied, equity risk would have the biggest impact on the decline in the available solvency margin relative to the shock size (see Chart III.17 Box). The effect of the shock in terms of the risk of lower government bond prices would also be significant. This is partly because the test also includes government bonds classified as held to maturity at amortised cost, which are valued at fair value in accordance with the principles of Solvency II. The impact of the shock on interest rate risk this year already fully incorporates the economic view of the interest rate risk of liabilities. Its magnitude in individual insurance companies is affected mainly by matching of the maturity profiles of assets and liabilities. As in the previous year, the impact of the stress scenario on real estate risk is noticeable, as insurance companies have in recent years been looking for other long-term investment opportunities given the environment of low interest rates. The favourable result for shocks for the risk of floods relative to the other risks shows that insurance companies have well-structured reinsurance treaties for catastrophic flood damage.

Owing to the persisting environment of low interest rates, the stress test was extended to include an additional scenario focused on testing the impacts of this environment and a qualitative assessment of reinvestment risk in the event of this environment lasting for a prolonged period.[44] The overall effect of the additional scenario on the aggregate eligible capital of the participating insurance companies was minimal. However, this was not the case for individual insurance companies, where the

prices, a 10% depreciation of the koruna and a rating-dependent increase in the corporate bond spread.

44 In this scenario, we assumed a flat risk-free yield curve, with yields of 0.26% and 0.39% for 10-year and 15-year maturities respectively.

matching of asset and liability flows was important. In a long-running environment of low interest rates, insurance companies in general face a risk of insufficient investment income on financial placement to cover the guaranteed technical interest rate (see section 3.1). The results of the qualitative assessment reveal that insurance companies are mostly opting for a strategy of changing their product structure to mitigate this risk. This chiefly involves focusing more on unit-linked life insurance and term life insurance and on reducing guaranteed rates on new insurance policies. In general, the sector does not foresee a need for any major change in investment strategy in the event of a prolonged period of low interest rates. The low interest rate environment should not cause domestic insurance companies any significant capital problems over the next few years. As part of its supervisory work, the CNB will continue to address this issue intensively. It will insist that insurance companies focus systematically on interest rate risk, on managing and assessing it not only in isolation, but also in the context of other investment risks, reinsurers' credit risk, lapse risk and other insurance risks, and on enhancing their ALM practices.

3.3 BANK LIQUIDITY STRESS TESTS AND LIQUIDITY REGULATION

Banks passed a liquidity stress test. Both the CNB's macro-stress testing and a liquidity coverage survey demonstrated a high resilience of Czech banks to liquidity shocks. Low diversification of the liquidity buffer, which consists mainly of domestic government bonds, remains a negative aspect of the sector's liquidity. A potential increase in the riskiness of this asset would be associated with a rise in liquidity risk.

The liquidity testing methodology has been changed slightly with regard to the LCR…

The assessment of the banking sector's resilience includes a macro-stress test of balance-sheet liquidity. The original two-round methodology introduced in FSR 2010/2011 has been adjusted slightly to make the test results comparable with the liquidity coverage ratio (LCR). It now works with two liquidity buffer levels. The narrower liquidity buffer concept (level 1) remains as defined in the original methodology.[45] The wider concept (level 2) is closer to the LCR liquidity buffer and includes also other freely transferable assets such as foreign government bonds, corporate securities and equity instruments. Due to their lower liquidity and loan quality, however, they are subject to higher stress haircuts, as in the LCR liquidity buffer calculation. The indicator used up to now to

45 The level 1 liquidity buffer for the one-month horizon is defined as the sum of cash, claims on the central bank (excluding minimum reserves), domestic government bonds and claims maturing within one month, while claims maturing within three months are taken into account for the three-month horizon. The liquidity buffer for the three-month horizon is equal to or greater than the liquidity buffer for the one-month horizon.

TABLE III.8

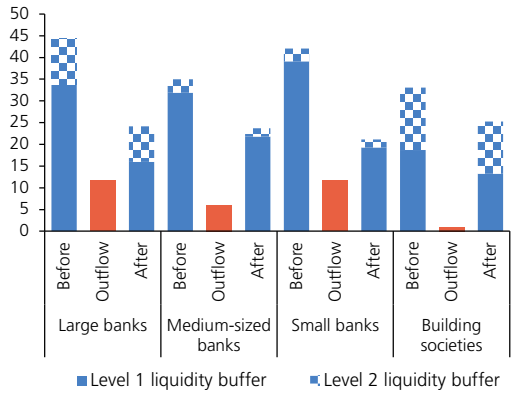
Scenario type and shock size in the liquidity stress test
(%)

Type of stress	Degree of stress
Outflow of uninsured/unsecured deposits from FIs except CB	20/25*
Outflow of uninsured/unsecured deposits from non-financial entities	15/20*
Outflow of secured/insured deposits	5/10*
Maturing of bonds issued**	100
Drawdown of credit lines from CIs	20/30*
Drawdown of credit lines from non-financial entities except government	10/20*
Unavailable claims on CIs**	30/50*
Unavailable claims on other clients except government and CB**	20/40*
Reduction in value of CZK bonds issued by domestic government or CI	15
Reduction in value of foreign-currency bonds issued by domestic government or CI	25
Reduction in value of bonds issued by foreign government or CIs	25
Reduction in value of bonds issued by non-financial corporations	35
Reduction in value of capital instruments	50

Source: CNB, CNB calculation
Note: *The first figure applies to the one-month test and the second to the three-month test. **Claims/liabilities maturing within one month and three months respectively. CIs = credit institutions, FIs = financial institutions.

CHART III.31

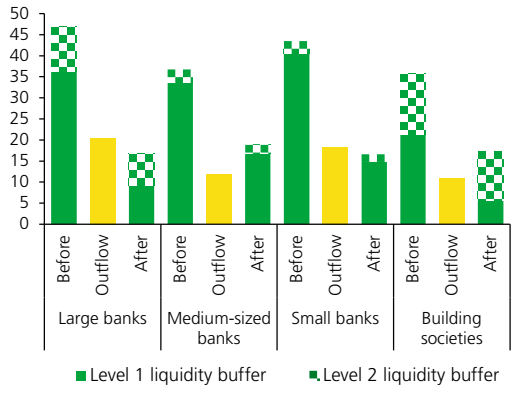
Results of the bank liquidity test at the one-month horizon
(% of total assets of individual groups of banks)



Source: CNB, CNB calculation
Note: The column "Before" represents the size of the unstressed liquidity buffer and the column "After" the size of the liquidity buffer after the two-round stress. The column "Outflow" represents the outflow of liquidity at the 30-day horizon.

CHART III.32

Results of the bank liquidity test at the three-month horizon
(% of total assets of individual groups of banks)



Source: CNB, CNB calculation
Note: The column "Before" represents the size of the unstressed liquidity buffer and the column "After" the size of the liquidity buffer after the two-round stress. The column "Outflow" represents the outflow of liquidity at the 90-day horizon.

assess resilience – the liquidity buffer-to-assets ratio – has been supplemented by another liquidity indicator defined as the ratio of the liquidity buffer for each level to the gross liquidity outflow. As in the case of the LCR, the lowest permissible value of the indicator is 100% (see section 4.2).

… but remains a two-round methodology for the one-month and three-month horizons

The banking sector was as usual tested at both the one-month and three-month horizons, primarily because of the lower sensitivity of the building societies sector to some shocks at the one-month horizon (as confirmed by the estimated LCR results – see below). The scenario was applied to 23 banks having their registered offices in the Czech Republic using the end-2014 data. In the first round of the impact, a liquidity outflow was generated for a crisis period of 30 or 90 days caused by increased demand for asset financing amid lower funds and a concurrent decline in the value of some assets with no difference in their accounting (see Table III.8). The second round of stress captures the consequences of the rise in reputational and systemic risk brought about by banks' efforts to cover the outflow and is expressed through additional losses arising from the revaluation of the assets used. Overall, these are strong stress scenarios.

The balance-sheet liquidity test confirms banks' resilience to liquidity shocks

The test results reveal that the banking sector as a whole would withstand the simulated stress and is able to cover a sudden outflow of liquidity at both the one-month and three-month horizons. This is mainly because the initial liquidity buffers are kept at high levels (see Charts III.31 and III.32). Although building societies have long held the lowest amount of level 1 quick assets, they hold a relatively high share of level 2 quick assets. On the one hand their total buffer is more diversified, but on the other it may be subject to higher losses in value in the case of riskier assets in a crisis period.

The impacts of the negative shocks on the balance sheets of the groups of monitored banks were mixed across them and also horizons. In terms of the aggregate decline in the total liquidity buffer, universal banks were hit hardest (a decline of more than 50% at both horizons). Such banks are most prevalent among large and small banks (see Charts III.31 and III.32). In the case of building societies, a small impact can be observed at the one-month horizon (a decline in the total buffer of around 23%) and a fairly large impact can be seen at the three-month horizon (a decline of almost 53%). In terms of the number of banks with exhausted buffers on an individual basis, the hardest hit were specialised banks, most of which hold hardly any quick assets. "Only" one bank would exhaust all the level 1 assets from its liquidity buffer at the one-month horizon, but even it would be able to cover the outflow using additional assets from its level 2 buffer. So, the liquidity ratio would not drop below 100% for any bank. Eight banks would fully exhaust their level 1 liquidity buffers at the three-month horizon, and three of them would not be able to cover the outflow using their level 2 buffers. These banks could thus face liquidity

problems in the event of a strong liquidity crisis. However, these are specialised banks with very specific business models.[46]

The test results are supplemented for the first time with LCR results…

The macro-stress test results were supplemented and confirmed by results obtained from a liquidity coverage survey (the estimated LCR). The LCR is different from the liquidity indicator used in the CNB's macro-stress test. It differs mainly in the calculation of the ratio, which, instead of the gross outflow, it also takes into account expected inflows of liquidity in the stress period (albeit up to a maximum of 75% and 90% of the outflows respectively). The composition of the liquidity buffer is also different, as the LCR does not include short-term claims in its buffer and stricter rules apply to the inclusion of specific types of transferable assets. However, the macro-stress tests are stricter in terms of the scenario, as they do not exclude any assets (or government bonds) from the stress, in contrast to the haircuts applied to the LCR. The differences in the calculation are visible in the comparison of the aggregate LCR results with the liquidity indicator (see Chart III.33), especially for medium-sized banks with a higher balance-sheet share of short-term claims on other credit institutions. On an individual basis, however, the results are largely the same. The results from the LCR survey and the macro-stress tests thus complement each other very well, since they allow for overall monitoring of the sensitivity of banks' individual models to different types of liquidity shock.

… confirming the resilience of the banking sector

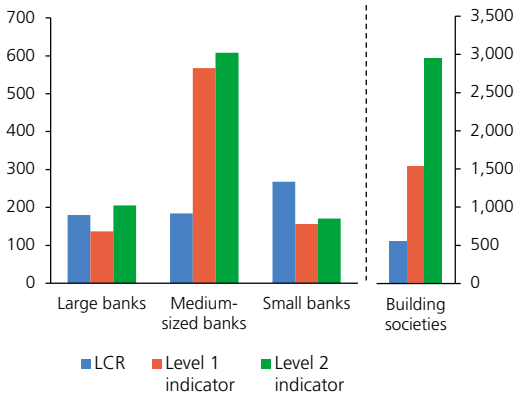
The LCR estimate performed on end-2014 data for all 23 banks operating in the Czech Republic[47] takes an aggregate value of 192%,[48] confirming a high degree of resilience of the domestic banking sector. Owing to the stress horizon considered (30 days), the LCR estimate is highest for building societies and is also high for small banks. The group of large banks has the lowest indicator value. Even in this case, however, the aggregate values are at 180% (see Chart III.33). Overall, the LCR liquidity buffer would fail to cover the expected net liquidity outflows for just two banks. Only one bank would not be compliant with the LCR requirement of 60% on an individual basis as required from October 2015. Again, this is a bank with a specific business model which holds virtually no liquid assets.

Given the universal applicability of this requirement to credit institutions in the EU, it is appropriate to assess the impacts of this regulation on the Czech banking sector. This can be done in a simplified way by comparing

CHART III.33

Comparison of the liquidity test results with the survey results for the LCR

(%; weighted by assets of individual groups of banks)



Source: CNB, CNB calculation
Note: The indicator is the ratio of the level 1 or level 2 liquidity buffer to the outflow of liquidity generated in the stress test.

46 By definition, very specific business models where long-term assets financed by issues of the institution's own securities come up against the minimum liquidity buffer (less than 5% of the balance sheet on average) cannot withstand the simulated stress.

47 Since the final text of the Commission Regulation governing the LCR is not known yet, the liquidity coverage template from EBA's consultation paper EBA/CP/2014/45 was used for the survey.

48 The LCR level for the entire banking sector and groups of banks was obtained by aggregating items across banks, while taking into account the limits on the individual items in the calculation applicable to each bank individually.

TABLE III.9

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

	Banks			Building	
	Large	Medium-sized	Small	societies	Total
Liquidity buffer	29	19	35	16	26
Liquid assets	29	19	35	17	26
Weighted average rate of eligibility after application of haircuts*	99	100	99	98	99
Expected outflows	26	14	16	5	21
Balances of outflows	98	62	91	30	83
Weighted average rate of outflow*	26	23	18	17	25
Expected inflows	10	4	4	2	7
Balances of inflows	12	14	7	3	11
Weighted average rate of inflow*	80	29	50	88	65
LCR	180	184	268	561	192

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

the ratio of liquid assets and the balances of liquidity outflows and inflows to the total assets of each bank type, taking into account the weighted average weights applied to these groups of items in the LCR calculation. These weights capture the extent to which items subject to large market haircuts and expected outflows/inflows in the stress period are represented in banks' balance sheets (see Table III.9).

Almost all assets from the LCR liquidity buffer are held by domestic banks in the form of level 1 liquid assets,[49] to which no haircuts on the market value are applied. In building societies and small banks, the expected outflows are represented mainly by retail deposits where the payout has been agreed within 30 days and retail deposits subject to higher outflow (an outflow of no more than 15% in either case). In large and medium-sized banks, the expected outflows consist mainly of non-operational deposits by financial customers and non-operational deposits by other customers not covered by Deposit Guarantee Scheme (outflows of 100% and 40% respectively). The difference between the LCR for building societies and that for large banks is therefore due mainly to a much smaller liquidity outflow relative to the size of the liquidity buffer in building societies. The difference between the LCR in large and small banks is due to a larger liquidity buffer in small banks. The expected inflows of liquidity are insignificant relative to the size of the expected outflows in domestic banks.

Composition of the liquidity buffer

Despite the estimated compliance with the LCR, excessive homogeneity of the liquidity buffer remains a negative aspect of the liquidity of the Czech banking sector. The buffer consists mostly of withdrawable reserves with the central bank and domestic government bonds. They account for more than 60% of the sector's liquidity buffer. In the event of adverse developments in public finance, the risk of excessive concentration of sovereign exposures (see section 4.5) might be accompanied by liquidity risk.

The Commission delegated regulation gives a more extensive recognition to covered bonds in the LCR

The more extensive recognition of covered bonds as assets making up the LCR liquidity buffer makes it possible to increase the diversification of portfolios of liquid assets. Nevertheless this recognition is subject to several quantitative and qualitative criteria, including requirements relating to minimum issue size, haircuts and over-collateralisation. The delegated regulation is based on an EBA analysis, according to which the main factors affecting the market liquidity of covered bonds are credit ratings, time-to-maturity, issue size and quality of regulation.[50] Moreover,

49 Commission Regulation 2015/61 defines four categories of liquid assets – level 1 assets, level 2A assets, level 2B assets and level 2B securitisations. In simplified terms, level 1 assets consist of exposures to central banks, government bonds and extremely high quality covered bonds.
50 EBA (2013): *Report on Appropriate Uniform Definitions of Extremely High Quality Liquid Assets (Extremely HQLA) and High Quality Liquid Assets (HQLA) and on Operational Requirements for Liquid Assets under Article 509(3) and (5) CRR.*

asset liquidity must be tested by regularly monetising a representative sample of assets.

Only a small quantity of covered bonds in the Czech Republic are freely for trading…

Covered bonds in the Czech Republic consist almost entirely of mortgage bonds. As of December 2014, there were 256 issues, with a total volume of CZK 412 billion, representing almost 7.8% of the domestic banking sector's total assets. Medium-sized banks account for the largest volumes of mortgage bonds issued. Issues take place mainly within banking groups (see Charts III.34 and III.35). There are no major differences between the accounting categories reflecting investors' intentions regarding the handling of mortgage bond holdings (see Chart III.35). Aggregate data for the banking sector reveal that almost all mortgage bonds represent long-term investments not held for trading (67%) or held as available for sale (31%). Less than 2% are held in the trading book. Most mortgage bonds are held by the domestic banking sector (CZK 246 billion, 89%). The rest are held by domestic insurance companies (CZK 26 billion) and PMC funds (CZK 4 billion). Here again, only a tiny proportion are held for trading. Very few mortgage bonds are freely available in the market.

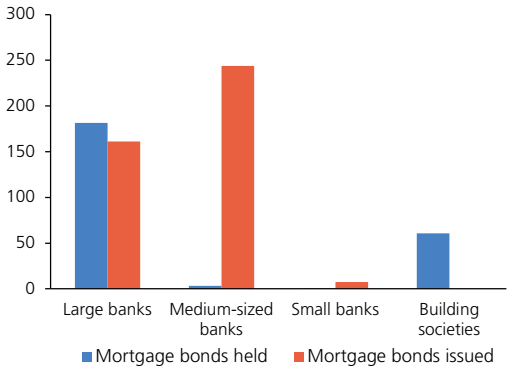
… and this is reflected in their low market liquidity

Using three basic market liquidity metrics – turnover, turnover ratios and ratio of zero-trading days – the relative liquidity of mortgage bonds was compared with the liquidity of covered bonds in the European market and of government bonds in the Czech and European markets on data for the period 1 January 2008–30 September 2014.[51] The analysis revealed that Czech mortgage bonds display lower liquidity for all the metrics and investment opportunities compared (see Table III.10). The lower turnovers are due mainly to the lower volumes of mortgage bonds compared to covered bonds in the European market. However, turnover is also five times lower in relation to the volume issued than in the European covered bond market. The ratio of zero-trading days also indicates low liquidity of the Czech mortgage bond market. Domestic mortgage bonds are traded on only 1% of trading days, i.e. once every 4.5 months on average. However, there are sizeable differences in frequency across issues – some of them are traded on 25% of trading days on average, while others are never traded.

51 The calculations for the EU were taken from an EBA analysis. Since the EBA documents do not give certain methodological details that affect the data base for the calculations, the comparison of the measured values may be somewhat distorted. The methodological differences in the calculations on Czech data may be to the detriment of mortgage bonds, as a more conservative approach was used whenever anything was unclear in the calculations. The EBA also presented other liquidity metrics derived from market price volatility in its analysis. These metrics were not calculated for mortgage bonds owing to the small number of quoted issues.

CHART III.34

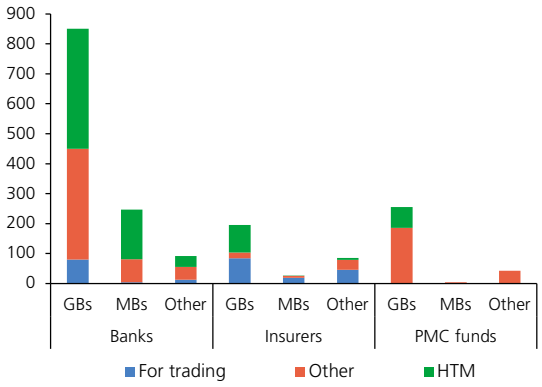
Mortgage bonds held and issued by domestic banks
(CZK billions)



Source: CNB

CHART III.35

Holdings of mortgage bonds and other types of debt securities by sector
(CZK billions)



Source: CNB
Note: HTM = held to maturity.

TABLE III.10

Comparison of the liquidity of the covered bond and government bond markets in the EU and the Czech Republic
(CZK billions)

Type of security	Turnover (CZK billions)	Turnover ratio	Zero-trading days
GBs (EU)	98.171	0.131	0.792
	(467.458)	(0.489)	(0.334)
GBs (CZ)	2.908	0.098	0.506
	(1.534)	(0.078)	(0.153)
CBs (EU)	4.232	0.059	0.884
	(22.577)	(0.29)	(0.218)
MBs	0.462	0.012	0.989
	(1.466)	(0.036)	(0.025)

Source: CNB, EBA
Note: CBs = covered bonds. The standard deviations of the indicators are given in parentheses.

Czech mortgage bonds do not satisfy the criteria for inclusion in the liquidity buffer

Insufficient market liquidity is not the only reason why Czech mortgage bonds cannot be included in the LCR liquidity buffer (special transactions could be used to formally satisfy the regulatory testing rule for market liquidity in certain circumstances). Czech mortgage bonds also fail to satisfy the quality requirements laid down in the Commission delegated regulation, especially the criterion on minimum regulatory over-collateralisation. A comparison of regulatory frameworks across selected EU countries[52] reveals that the current regulation of covered bonds in the Czech Republic is less specific in most key areas of liquidity and credit quality and is not compliant with the recommended provisions in several areas. These provisions include, for example, a stable share of mortgage loans backed by residential and commercial property, the stipulation of minimum over-collateralisation and the regulation of all risks associated with covered bonds. For this reason, it is desirable to amend the rules for covered bonds. The ability to diversify the current fairly homogeneous liquidity buffer will be enhanced if, in the future, mortgage bonds can be treated as liquid assets for LCR purposes.

52 EBA (2014): *EBA Report on EU Covered Bond Frameworks and Capital Treatment*.

4 RISKS TO FINANCIAL STABILITY AND MACROPRUDENTIAL POLICY

The aim of this section is to assess the main risks to financial stability and to provide information about risk mitigation tools. To this end, the text evaluates the risks stemming from the external environment, the current position of the Czech economy in the financial cycle, the resilience of the Czech financial sector to the risks identified, and the tasks and recommendations arising from the analyses for macroprudential policy, microprudential supervision and other economic policies. The first part contains an assessment of financial stability indicators, including a macroprudential dashboard. The second part describes the CNB's measures to mitigate sources of risks to financial stability. The third, fourth and fifth parts provide detailed information about the use of specific macroprudential tools to reduce procyclical behaviour by the financial sector and risks relating to property and sovereign exposures. The final, sixth part describes developments in the national and international regulatory environment, macroprudential policy in the EU, progress in the banking union area and the capital markets union project.

4.1 SOURCES OF RISKS TO FINANCIAL STABILITY

High private sector debt in advanced countries remains an obstacle to renewed robust economic growth

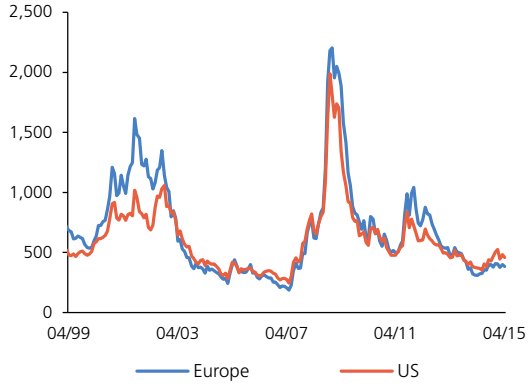
The fragility of the economic recovery remains a significant source of risks to financial stability in advanced countries. A return to recession would lead to higher credit losses, which would complicate the still unfinished process of stabilisation of bank balance sheets. Credit growth remains subdued in many advanced countries and no major recovery is likely in the next few years owing to high private sector debt. Sluggish rates of growth in credit, and in some countries absolute declines in the stock of credit to the private sector, are amplifying the risk of a sustained deflation trend. Uncertainty surrounding the continuation of the economic recovery and deflationary pressures are forcing central banks to carry on with very accommodative monetary policy. This is heightening the importance of preventive macroprudential policies.

Historically low interest rates and yields on high-quality assets are a source of market risks

Zero or negative monetary policy interest rates and very low yields on most government bonds and other high-quality assets are motivating many investors to take on increased risks. Low interest rates on loans and other sources of external financing may encourage people to buy property or other assets in order to take advantage of the favourable conditions to attain better returns. This may result in some asset prices rising above levels consistent with the long-term trends in fundamental factors. From the global perspective, growth in prices on bond markets combined with a decline in bond risk premia is a possible risk. The yield spreads of US and European high-yield corporate bonds have fallen to unusually low levels close to their pre-crisis figures (see Chart IV.1).

CHART IV.1

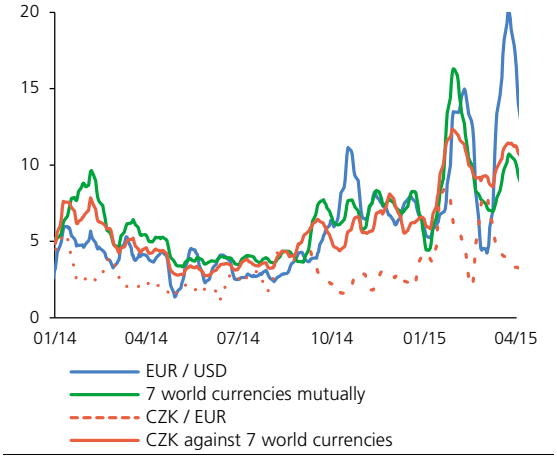
Yield spreads on risky private sector bonds
(bp)



Source: Bloomberg L.P.
Note: Yield spread means the option-adjusted spread between private sector and government bond yields; a risky bond is a speculative-grade bond (BB+ or lower).

CHART IV.2

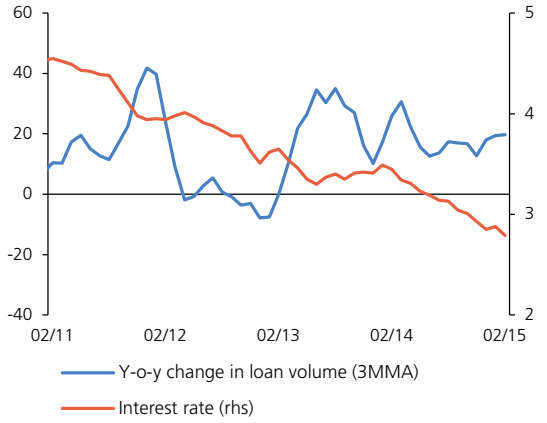
Exchange rate volatility
(% on annual basis)



Source: Bloomberg L.P.
Note: The seven world currencies are USD, EUR, JPY, GBP, AUD, CHF and CAD. Volatility is calculated as the average day-to-day change in the exchange rate over a ten-day moving window. The largest and smallest day-to-day changes are not used. Smoothed by the five-day moving average.

CHART IV.3

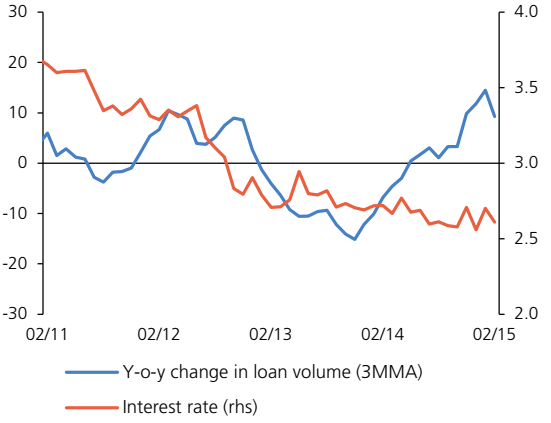
New koruna loans to households for house purchase
(%)



Source: CNB
Note: The data for households also include data for non-profit institutions serving households. Loans to households for house purchase also include refixed and refinanced loans.

CHART IV.4

New koruna loans to non-financial corporations
(%; including overdrafts)



Source: CNB
Note: New koruna loans to non-financial corporations also include overdrafts.

Rather than a low risk level, this may indicate a reduced ability of the markets to price risks. A sudden correction in bond prices (for example in response to negative economic news or stronger geopolitical risks) could then be amplified by low market liquidity on bond markets.[1] Owing to strong correlation between many assets, there could be contagion to other markets and subsequent sizeable market losses. In the euro area, this risk is exacerbated by uncertainty surrounding the repayment of Greek sovereign debt.

Emerging economies also face risks of increased volatility

Uncertainty regarding the timing of the change in the monetary policy stance of key central banks remains a significant potential source of higher financial market volatility. The appreciation of the US dollar in late 2014 and early 2015[2] (which was partly due to communication by the Fed on the gradual normalisation of monetary policy) resulted in a large outflow of capital from several emerging economies. Further appreciation of the dollar could have an adverse effect on countries where the private or public sector has a high proportion of dollar-denominated debt. These countries include Turkey, Russia and many Asian and Latin American countries. A further rise in currency market volatility (see Chart IV.2) and a loss of confidence in continued rapid growth of these economies could restrict their access to liquidity and lead to currency depreciation, an increase in credit defaults and considerable losses on the part of investors.[3]

The Czech economy is gradually bouncing back from the bottom of the financial cycle

The domestic economy is currently in a phase of the financial cycle that can be regarded as the onset of a recovery. This is evidenced by a slightly rising financial cycle indicator and other indicators described in more detail in section 4.3. Growth in bank loans to the private sector is increasing slightly (see Chart IV.17). However, developments differ across specific segments. New koruna loans to households for house purchase have been rising at an average rate of 19% since early 2013 (see Chart IV.3).[4] New loans to non-financial corporations started rising during the last year, following a period of year-on-year declines[5] (see Chart IV.4).[6] This trend continued into 2015 Q1, when new corporate loans rose by around 9% year on year. Overall, the risk of excessive

1 As regards liquidity, there are concerns about the ECB's government bond purchases under its new quantitative easing programme, which could reduce the availability of these liquid assets on the market.
2 Between October 2014 and March 2015, the US dollar appreciated more against the other major currencies than during any other similar period since 1981.
3 The imposition of economic and financial sanctions on Russia in August 2014 had a similar impact. This led to a weakening of the Russian rouble, a downgrade of the country's credit rating to the lowest investment grade and a capital outflow from Russia.
4 These loans also include refixed and refinanced loans, which accounted for more than one-third of total new loans in March 2015.
5 This can be partly explained by increased bond issuance, as the share of bonds in the sector's total financing has been growing in recent years (see section 2.2).
6 However, the base period of 2013, to which the year-on-year changes in this text relate, was significantly below average in the case of loans to non-financial corporations. As a result, the year-on-year growth must be interpreted with caution.

growth in lending remains low. This is a key guide for determining the countercyclical capital buffer, which is dealt with in section 4.3.

The recovery in bank loans is being accompanied by an easing of credit standards and a further drop in interest rates…

The results of the Bank Lending Survey[7] suggest that the credit standards applied to all types of loans to corporations and households began to ease in 2014. This trend continued into 2015 Q1. The softer lending conditions coupled with historically low interest rates may boost the interest of households and firms in new loans and increase their willingness to take on higher investment risks. This is particularly true of loans for financing property purchase and construction.

… which may become a source of risks for households and credit institutions

Expectations of further property price growth combined with the aforementioned loan market tendencies in the area of financing of property purchases and construction may become a potential source of systemic risk. Thanks to low interest rates, loans to households for house purchase are becoming more affordable for borrowers with lower and less stable income, who are more likely to experience repayment problems at times of rising interest rates or worse economic development. At the same time, the perceived attractiveness of buying to let as an investment is increasing. In the event of adverse economic developments, such borrowers may have a weaker incentive to repay than in the case of owner-occupied housing. Property price growth usually leads to a rise in the amount of loans provided, which increases the vulnerability of borrowers' budgets. A CNB survey of LTV and LTI for new loans secured by residential property (see section 4.4) indicates a rise in this type of risk.

The low interest rates are favourably affecting the financial situation of borrowers…

A falling amount of interest paid (see Chart IV.5), related to the marked decrease in interest rates, is having a favourable effect on the debt servicing costs of non-financial corporations and households. Together with the recovery in credit growth, this is fostering a rise in domestic demand and a recovery in economic activity.

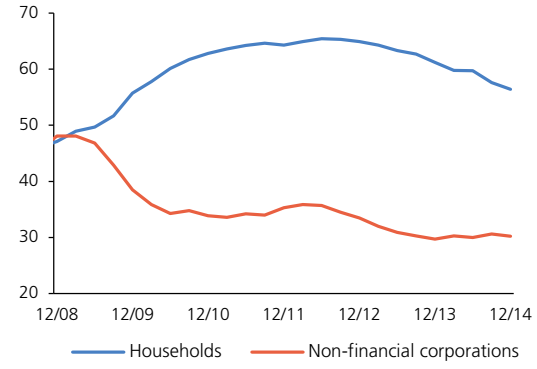
… but are squeezing the profitability of financial institutions

The decrease in interest rates has been accompanied by a decline in interest margins in recent years. Margins on bank loans to households for house purchase continued to record historical lows during 2014 (see Chart IV.6). By contrast, the interest rate margin on bank loans to non-financial corporations stabilised (see Chart IV.7). If the current very low level of interest rates were to persist for a long time or even fall further, it could have an adverse effect on the profitability of credit institutions, whose income depends heavily on interest margins (see Box 3 in

7 CNB (2015): *Bank Lending Survey*, January and April 2015.

CHART IV.5

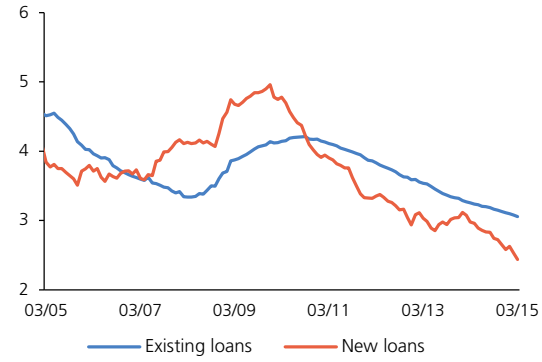
Interest paid on bank loans
(CZK billions; annual moving totals)



Source: CNB

CHART IV.6

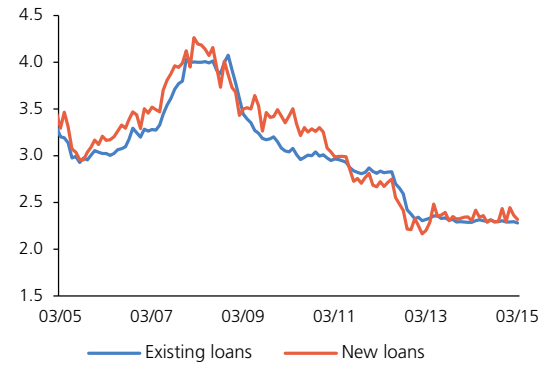
Margins on bank loans to households for house purchase
(pp)



Source: CNB
Note: The margin on existing (new) loans is calculated as the difference between the interest rate on the stock of (new) loans to households for house purchase and the interest rate on the stock of (new) total deposits.

CHART IV.7

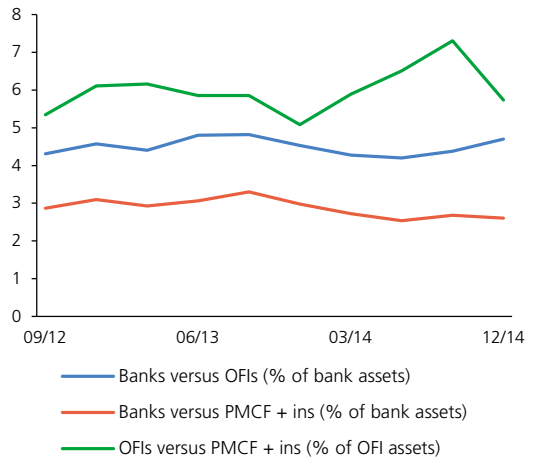
Margins on bank loans to non-financial corporations
(pp)



Source: CNB
Note: The margin on existing (new) loans is calculated as the difference between the interest rate on the stock of (new) loans to non-financial corporations and the interest rate on the stock of (new) total deposits.

CHART IV.8

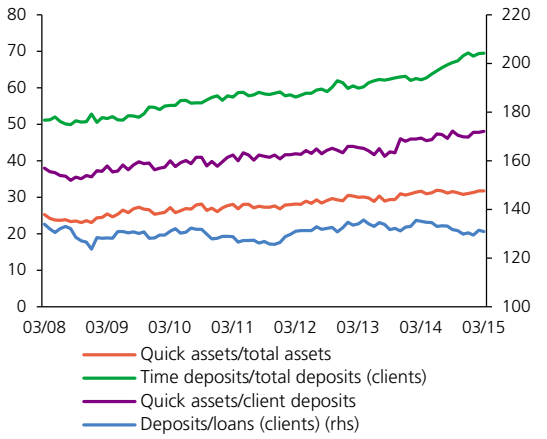
Interconnectedness of segments of the financial sector
(sum of all mutual exposures in assets and liabilities between sector pairs in % of assets)



Source: CNB, financial accounts
Note: OFIs comprise other financial corporations engaged in lending and mutual funds other than money market funds. PMCF + ins comprises pension management companies, funds of pension management companies and insurance companies.

CHART IV.9

Banking sector liquidity ratios
(%)



Source: CNB

section 3.1). This is particularly true of building societies, which have a limited ability to react quickly to a decline in market interest rates under the legal framework for building savings. Low interest rates may also negatively affect the performance of insurance companies (see section 3.1).

There are no major changes in the links within the financial sector

The individual segments[8] of the financial sector are directly interconnected through exposures in the form of deposits, loans, ownership interests and other instruments. A strengthening of the links within the financial sector could intensify the structural component of systemic risk, leading to an increased risk of the emergence and spread of financial distress across segments. However, the volume of financial assets making up the individual links saw no major changes in 2014 either in absolute terms or as a percentage of the financial assets of the individual segments (see Chart IV.8). A slight rise in financial system interconnectedness can be observed in the area of concentration of bank liabilities. The share of the five largest liabilities to credit institutions, including foreign ones, in regulatory capital rose by 4.5 pp to 121% (see part 2 of the macroprudential dashboard).

Growth in risks connected with the structural and cyclical components of systemic risk is being suppressed by robust banking sector liquidity

The Czech banking sector has long maintained an above-average liquidity position by international comparison, and the ratio of quick assets to total assets stayed high in 2014 (see Chart IV.9). The sector thus still has a marked excess of deposits over loans provided. However, the share of demand deposits in total deposits is still rising and maturity transformation is increasing due to a growing share of long-term corporate loans[9] and loans secured by property in total bank loans as well. This may be a risk factor in the event of sudden liquidity shocks on the money and bond markets.

The macroprudential dashboard

As in FSR 2013/2014, a graphical overview of recent developments in selected systemic risk indicators is provided using a graphical tool called the macroprudential dashboard (see Table IV.1) Indicators suggesting a need for easier or tighter macroprudential policy are distributed evenly within the dashboard. Most of the indicators are little changed compared to last year. The dashboard suggests that low interest rates stand out as a potential source of systemic risk. This risk is captured by the very low level of ten-year government bond yields and by the low interest rate margin.[10] By contrast, a weakening of future risks is evident, for example, in only modest growth in the total stock of loans in the economy. The

8 The financial sector comprises the segment of monetary and financial institutions, insurance companies and pension funds and the segment of other financial intermediaries.
9 The ratio of long-term bank loans to non-financial corporations to total loans to non-financial corporations rose by 1.6 pp year on year to 53.2%.
10 Part 1b of the macroprudential dashboard now shows the share of government bond holdings in bank assets.

risks to financial stability are being kept at a low level thanks also to a further increase in banks' capital adequacy and low leverage.

Of course, the CNB's decisions on the configuration of macroprudential tools cannot be based mechanically on simplified instruments such as the dashboard, which serves more as a way of presenting the risks identified. The decisions are based on many other, more detailed data and model-supported considerations. The multi-criteria nature of the financial stability objective makes it necessary to expertly assess whether each particular indicator value reflects the emergence of future risks or the materialisation of past risks, whether it indicates a short-term or medium-term risk, and so on. A more detailed assessment of the risks described by the individual indicators is given in the following subsections.

TABLE IV.1

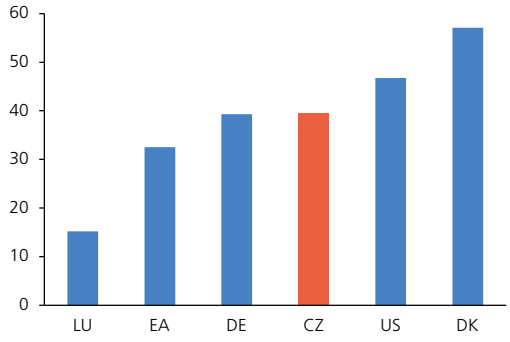
Macroprudential dashboard (key financial stability indicators in 2013 and 2014)
(distance from benchmark expressed as number of standard deviations)

1. RISK FACTORS (sources of risks associated primarily with financial cycle)	
1a. Short-term	
Real GDP growth (year on year, %)	
Real gross disposable income growth (year on year, %)	
Interest expenses/gross disposable income (%)	
Non-performing loans/total loans (%)	
Growth in demand deposits in banks (year on year, %)	
10Y government bond yield (average for period, %)	
Growth in residential property prices (transaction prices, %)	
Dividends (% of CET1 of banks)*	
1b. Medium-term	
Volume of bank loans to private sector/GDP (%)	
Y-o-y growth in bank loans to private sector (%)	
Public sector debt/GDP (%)	
Household debt/nominal gross disposable income (%)	
Government bond holdings/bank assets (%)	
Apartment price/average annual wage	
Apartment price/annual rent (according to IRI)	
Interest margin (new loans vs. deposits, %)	
2. MULTIPLICATION OF IMPACTS ON FINANCIAL SYSTEM (sources of risks primarily of structural nature)	
Interconnectedness in banking sector (%)	
Concentration of bank claims (five largest/CET1, %)	
Concentration of bank liabilities (five largest/CET1, %)	
3. ABSORPTION MECHANISMS IN FINANCIAL SYSTEM	
3a. Absorption of all types of shocks	
Excess of CET1 of banks above regulatory minimum (pp)	
Leverage (bank assets/equity)	
3b. Absorption of credit risk	
Aggregate LTV for residential mortgage loans (%)	
NPL coverage ratio (provisions/NPLs, %)	
3c. Absorption of liquidity risk	
Quick assets/total assets of banks (%)	
Client loans and credit facilities/client deposits of residents (%)	

Source: CNB, CZSO
Note: Unfilled (filled) values are for 2013 (2014). Green (red) indicates a need to consider looser (tighter) macroprudential policy; grey signifies no clear indication in either direction in the current situation. The benchmarks for the indicators are estimates of the trend values or the averages since 2002 (or later, depending on data availability). The indicators are unweighted, so the same values for different indicators can mean different contributions to total systemic risk.
* Dividends paid out of the profits of the previous year and earlier periods.

CHART IV.10

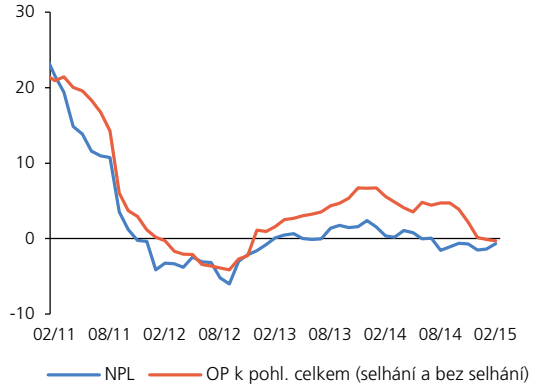
Share of loans for house purchase in total bank loans to the non-financial sector
(%; 2014)



Source: ECB, Fed
Note: LU and DK are the countries with the lowest and highest figures in the EU. Bank loans to the non-financial sector also include debt securities.

CHART IV.11

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



Source: CNB
Note: The data are adjusted for the exposures of the Czech Export Bank and take into account the merger of the Czech and Slovak UniCredit Bank.

4.2 MACROPRUDENTIAL POLICY RECOMMENDATIONS AND INSTRUMENTS

4.2.1 MACROPRUDENTIAL POLICY RECOMMENDATIONS

Financial institutions must maintain a high loss-absorbing capacity

The robust capital adequacy, favourable aggregate capital ratio and high degree of liquidity and profitability of Czech banks form a stable basis for absorbing shocks in the event of adverse developments (see section 3.2). All this is also of key importance for maintaining high public and investor confidence in the stability of the Czech banking sector. To cover credit and market risks and the risk of a potential deterioration in profitability due to changes in the interest rate environment, it is essential in the current situation to maintain high levels of capital, including the capital buffers applied by the CNB under CRD IV since 2014 (see sections 4.2.2 and 4.3). Maintaining robust capital buffers is of particular importance for banks that are systemically important by dint of their position and character. If new systemic or sectoral risks are identified, the CNB will use all the means at its disposal – in particular the capital and liquidity regulatory framework for macroprudential policy and microprudential supervision – to increase the stability of the financial sector.

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

The more optimistic expectations of corporations and households, the low interest rates, the strong balance-sheet liquidity of banks, the softer credit standards and the renewed property price growth are starting to affect the housing loan market (see sections 2.3 and 2.4). The growth in residential property prices and the increasing profitability of buying to let are creating potential for the emergence of a price spiral between property prices and housing loans. According to CNB analyses, the configuration of credit standards on the housing loan market remains mostly conservative. However, growing diversity between banks' approaches and increasing tendencies to provide riskier loans for house purchase can be observed (see section 4.4). The CNB does not currently assess this as a direct source of risk. As loans to households for house purchase represent the largest part of the credit portfolio of domestic banks (and are also very significant by international comparison; see Chart IV.10), the CNB deems it necessary to deploy preventive tools to counteract growth in these risks in the years ahead. These tools consist in a set of recommendations for credit institutions providing retail loans secured by residential property (see section 4.4). If the domestic property market started to show signs of overheating in future years, the CNB would apply the tools defined in the CRD IV/CRR legislation to mitigate the risks associated with exposures to the residential property market. In particular, these tools include higher sector-specific risk weights for the calculation of capital requirements for banks.

The concentration risk associated with sovereign exposures will be stress tested

Given the continued growth in client deposits and subdued demand for loans among non-financial corporations, banks are allocating a significant

proportion of their funds to government bonds (mainly Czech ones). Their share in banks' total assets increased slightly year on year in the Czech Republic. The accumulation of government bonds in banks' balance sheets is natural for a number of reasons, but there is an increased risk of concentration in some banks. The CNB has therefore created a methodology for reviewing and assessing the systemic aspect of sovereign exposure concentration. In applying this methodology, the CNB will conduct an annual stress test of Czech public finance and, where necessary, will set an additional capital requirement under Pillar 2 for banks with increased sovereign exposure concentration risk (see section 4.5 for more details). Given the stability of Czech public finance, however, the CNB will not apply additional capital requirements over the next three years. In addition to sovereign risk, the government bond portfolio is associated with market risk, which increased further in 2014 and in the first few months of this year as a result of global financial market developments (see section 2.1).

Credit risk requires increased monitoring

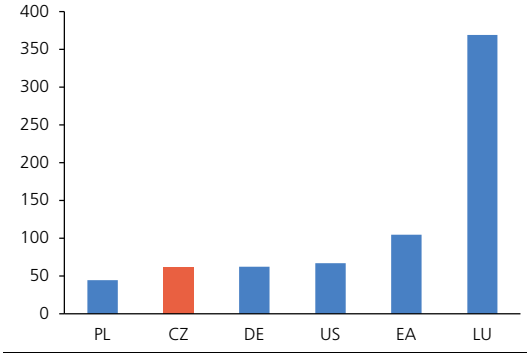
The economic recovery in 2014 helped reduce credit risk in non-financial corporations and stabilise credit risk in households. The favourable trend is also evidenced by NPL growth and provisioning in the banking sector as a whole (see Chart IV.11). Latent balance-sheet and off-balance-sheet credit risk decreased and the long-running decline in total risk weights halted. On the other hand, NPLs are continuing to migrate to the worst loss category and their past-due period is getting longer. Exposures to non-financial corporations in some sectors (construction and energy) and some categories of clients (particularly small enterprises) are showing an increased level of risk, which may reflect deeper problems of a non-cyclical nature. The escalation of geopolitical risks is increasing the riskiness of loans to non-residents and non-financial corporations with strong international links. The credit risk of both non-financial corporations and households is currently being suppressed by the relatively low debt ratios of these sectors (see Charts IV.12 and IV.13) and by low interest rates on loans. However, these may also become a source of vulnerability due to easier availability of loans. As the economy is starting to shift to a more expansionary phase of the business cycle, the CNB will closely monitor bank credit standards.

The CNB will continue to focus on the resilience of banks and credit unions

The banking sector as a whole is in good shape. This is confirmed by the solvency and liquidity stress test results (see sections 3.2 and 3.3). However, significant differences in capitalisation, profitability and approaches to credit risk and liquidity management persist across institutions. Small banks are vulnerable because of their low profitability, so due care and attention will be paid to them. The regulatory framework applying to building societies,[11] which forbids changes to deposit interest rates during the six-year saving cycle, exposes this segment to profitability

CHART IV.12

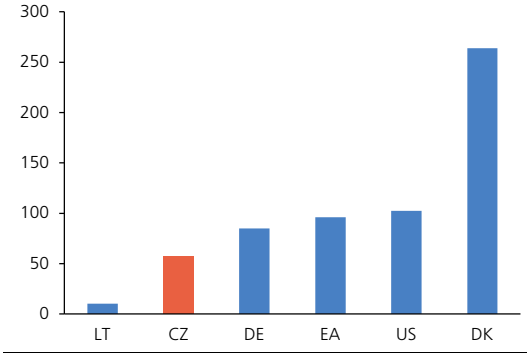
Ratio of debt of non-financial corporations to GDP
(%; 2014 Q3)



Source: ECB, White Book
Note: PL and LU are the countries with the lowest and highest figures in the EU. The figures do not include data for MT.

CHART IV.13

Ratio of household debt to GDI
(%; 2014 Q3)

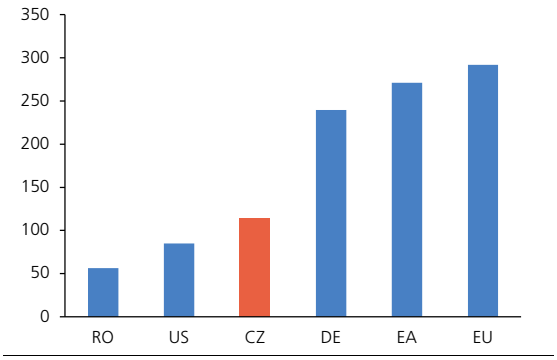


Source: ECB, White Book
Note: LT and DK are the countries with the lowest and highest figures in the EU according to the available data. The data for LT are for 2013.

11 Article 5(7) of Act No. 96/1993 Coll., on Building Savings Schemes.

CHART IV.14

Ratio of banking sector size to GDP
(%; 2013)



Source: ECB, Fed
Note: The ratio of the aggregate total assets of commercial banks to GDP. RO and LU are the countries with the lowest and highest figures in the EU.

risk linked with the environment of sustained low interest rates (see Box 3 in section 3.1). The credit unions segment is undergoing changes connected with the amendment of its legal framework. In the long term, this will significantly reduce risky behaviour, which has had negative effects in past years. In the interim, however, the segment will need close monitoring. On a general level, it is essential for banks and credit unions to remain prudent in measuring the risks linked with their claims and in classifying their loans, to assess collateral quality conservatively, to set aside sufficient loan loss provisions and to manage their NPL portfolios effectively. The low interest rate environment, which is associated with a risk of a sudden adjustment of asset prices and a rise in interest rates and the interest spread, is increasing the need for prudential management of interest rate risk. In its supervisory work, the CNB will therefore continue to focus on compliance with the requirements for the structure and level of capital adequacy and the quality of credit and interest rate risk management and with the liquidity management rules.

Pension management companies must focus on the risks associated with a potential rise in interest rates

A sharp rise in interest rates from their current very low levels poses a significant risk to pension management companies, as the transformed funds they manage hold most of their portfolios in debt securities. Pension management companies should therefore prudently assess the size of the impact of a potential rise in interest rates and the ensuing decline in the prices of their debt securities holdings. Such developments would lead to negative valuation differences, as occurred in 2007–2009, and the value of the assets of the transformed fund could fall below the value of its liabilities. The pension management company would then be obliged to increase the capital of the transformed fund from its own resources, which would lead to a potentially significant decrease in its capital adequacy.

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

Within the European supervisory authorities, the CNB is actively involved in the preparation and implementation of the regulatory tools and measures required by the CRD IV framework; within the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS) it participates in discussions on the development of standards for the banking sector; and within the ESRB it is involved in designing macroprudential policies. Proposals for new regulations in the EU require constant close attention, as they sometimes only take account of the features of the financial sectors of euro area countries and do not always suit the Czech financial sector. This applies in particular to the banking sector, which applies traditional, conservative approaches and is small by comparison with the euro area (see Chart IV.14). One regulatory initiative that presents a potentially significant risk from the perspective of the Czech financial sector is the directive establishing a framework for recovery and resolution. One part of this directive that may have considerable macroprudential consequences in the Czech Republic is the introduction of a tool for writing down or converting capital instruments and eligible liabilities, specifically a minimum requirement for own funds

and eligible liabilities (MREL). The CNB commented on the draft regulatory technical standards on MREL prepared by the European Banking Authority (EBA). The draft did not take sufficient account of conservative and locally oriented retail banks, which finance their activities fully or mostly from insured deposits. Were it to be implemented, it could have a negative effect on the asset and liability structure of domestic banks. Within the EBA, the CNB will therefore lobby for resolution authorities to be allowed to take account of a bank's business model, mode of financing and risk profile when setting its MREL.

The CNB considers stabilisation of the regulatory framework to be a priority

Besides contributing positively to the stability of financial systems, the plethora of international and European regulatory initiatives rolled out in past years may have some unintended adverse consequences. These may be linked with regulatory overlaps pertaining to various types of risks. Many of the new regulations are targeted at mitigating risks associated with the functioning of large and complex institutions: the capital buffer for global and other systemically important institutions, the systemic risk buffer, Pillar 2 instruments, TLAC/MREL requirements and – in some countries – the leverage ratio. Numerous initiatives are also focused on preventing excessive leverage or excessively low risk weights: the leverage ratio, sectoral risk weights, the revision of standardised and model approaches, and minimum risk weights in the Basel rules. Several instruments should also help reduce procyclicality in the financial sector: the countercyclical capital buffer, the new IFRS 9 method for accounting for asset impairment, the leverage ratio and the Pillar 2 tools. This complex regulatory framework will prevent the emergence of unregulated grey areas, but it may also create opposite incentives as regards the asset and liability structures chosen by banks. These could have a negative effect, for example, on the financing of corporate exposures and long-term investment projects. Banks may also concentrate too much on implementing the new regulations or, conversely, on seeking ways of circumventing them, to the detriment of client services and prudential risk management. In light of all this, the CNB feels that stabilisation of the regulatory framework should be a priority in the years ahead.

4.2.2 MACROPRUDENTIAL POLICY INSTRUMENTS

Macroprudential authorities can choose relevant macroprudential tools to mitigate sources of systemic risk once they have identified them.[12] In addition to capital buffers, the CNB has at its disposal tools targeted at specific and sectoral risks (see Table IV.2).

TABLE IV.2

Summary of macroprudential instruments

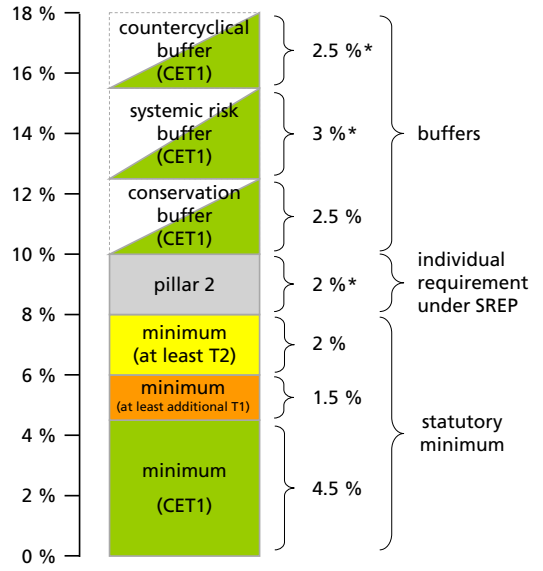
Systemic risk	Key instruments	Applied in CZ	Detailed information
Excessive credit growth and leverage	Countercyclical capital buffer	Yes, since 2014, zero rate	section 4.3
	Leverage ratio	Expected as from 2018	section 4.2.2
	Capital requirements by sector (in particular real estate exposure)	No increases as yet	section 4.4
	Systemic risk buffer	Yes, for four banks since 2014	section 4.2.2
	LTV/LTI caps	Yes	section 4.4
Excessive maturity mismatch and market illiquidity	Stable funding restrictions (e.g. NSFR, LTD)	Expected in future	section 4.2.2
	Liquidity coverage ratio (LCR)	Yes, as from 1 October 2015	section 4.2.2
	Liquidity charges	No	-
Exposure concentration	Large exposure restrictions and capital requirements (by counterparty, sector, geographic)	Yes, option of additional capital requirements to cover risk of concentration of sovereign exposures, methodology in place as from 2015	section 4.5
Misaligned incentives	SIFI capital surcharges (G-SII and O-SII buffer)	No	section 4.2.2
	Systemic risk buffer	Yes, for four banks since 2014	section 4.2.2

Source: CNB
Note: The classification of risks and tools is based on the Flagship Report on Macro-prudential Policy in the Banking Sector (ESRB, 2014).

12 The CNB bases its choice of appropriate macroeconomic policy tools on the ESRB recommendation on intermediate objectives and instruments of macroprudential policy. The individual tools are described in detail in *The ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector*.

CHART IV.15

Structure of capital requirements



Source: CNB
Note: * Expected upper limit, but actual values may be higher.

Since last year, the CNB has been using several types of capital buffers, including a capital conservation buffer, a countercyclical capital buffer and a systemic risk buffer. Banks have to keep these buffers above the statutory minimum capital requirement (see Chart IV.5). This year, the CNB will also introduce a set of recommendations on management of risks associated with providing loans secured by residential property (see section 4.4) and a Pillar 2 instrument to reduce risks associated with concentrations of sovereign exposures in banks' balance sheets (see section 4.5).

All banks are required to hold the capital conservation buffer at the full amount of 2.5% of CET1 as from July 2014. In August 2014, the CNB also announced a countercyclical capital buffer, currently set at 0%.[13] The CNB sets this buffer rate on a quarterly basis about one year in advance. Information on the setting of this rate for the period starting in July 2016, including a detailed analysis of the factors which the CNB takes into account, is provided in section 4.3. As from 2016, banks will adopt the rates set in other member countries (or EEA countries) for the calculation of the countercyclical capital buffer. Up to a rate of 2.5% of the overall risk exposure banks will adopt the rate automatically. If the rate is higher than 2.5%, the CNB will recognise that rate or set a rate of 2.5%. As from 2016, banks will also adopt the rates set in non-member countries. For exposures in these "third" countries the CNB will be able to introduce a non-zero rate or raise a rate that is lower than 2.5% to 2.5%. If the rate is higher than 2.5%, the CNB will again be able to recognise it or set a rate of 2.5%.

Since November 2014, the CNB has set systemic risk buffer rates for the four most systemically important banks: 3% of risk-weighted exposures for Česká spořitelna and ČSOB, 2.5% for Komerční banka and 1% for UniCredit Bank. Under the relevant provisions of CRD IV, the buffer rate will have to be reviewed in two years' time at the latest, i.e. in the second half of 2016. Macroprudential authorities in a number of other EU countries have also introduced systemic risk buffers as a means of combating certain systemic risks.[14]

Under CRD IV and related implementing regulations of the EBA, the CNB is also required announce a list of institutions that in its view satisfy the definition of other systemically important institutions ("O-SIIs") by the end of 2015. Given the method the CNB has chosen for determining the set of institutions subject to the systemic risk buffer, it is reasonable to assume that the list of O-SIIs will largely overlap with the list of institutions for which the systemic risk buffer has been declared. Subsequently, the CNB may (but does not have to) declare a specific "buffer relating to other systemically important institutions" for O-SIIs. The CNB is not currently planning to do so. However, conversion of the

13 The countercyclical capital buffer rate was set at 0% for the period starting in October 2015 and will remain at this level for the period starting in April 2016.
14 A list of national macroprudential authorities is published on the ESRB website: https://www.esrb.europa.eu/mppa/html/index.en.html.

systemic risk buffer into the buffer relating to other systemically important institutions is not ruled out in the future. This will depend on developments in the European legislation.

The leverage ratio

The leverage ratio is one of the capital tools constraining the systemic risk of excessive credit growth and leverage (see Table IV.2). Basel III defines it as the ratio of Tier 1 capital to non-risk-weighted exposures. It is to be implemented in full at the start of 2018. Basel III sets a preliminary regulatory limit of 3% for the leverage ratio, i.e. a bank's assets should not exceed its Tier 1 capital multiplied by 33. According to preliminary data, all but two Czech banks were compliant with this level at the end of 2014 (see Chart III.10 in section 3.1).

The Basel Committee is to set the final definition and calibration of the leverage ratio by the end of 2017. This final form may be affected by the debate on the sufficiency of the 3% limit currently ongoing not only within the Basel Committee and EU bodies, but also in many countries around the world. Some countries have already announced their intention to incorporate part of the capital buffers for systemically important banks or part of the countercyclical capital buffer into the leverage ratio.[15] This would involve the creation of a "macroprudential leverage ratio", which should reflect the total capital requirement expressed in terms of Tier 1 capital inclusive of capital buffers. At EU level, the ESRB[16] is analysing the macroprudential leverage ratio. It supports application of the macroprudential leverage ratio at the discretion of national macroprudential authorities.

Liquidity buffers

A liquidity coverage requirement[17] comes into force this year. It is intended to strengthen the liquidity position of credit institutions and reduce their dependence on short-term financing or liquidity provided by the central bank. This general requirement is specified in more detail in a Commission regulation effective from 1 October 2015, which introduces the liquidity coverage ratio (LCR).[18] The LCR is defined as the ratio of the liquidity buffer to net liquidity outflows over a 30 calendar day stress period. The LCR will be phased in as follows: a minimum of 60% from October 2015 rising to 100% on 1 January 2018. The definition in the Commission regulation introduces several major changes compared to the general requirement. The requirement to conduct a stability test on all retail deposits has a substantial impact on the LCR calculation for the

15 The USA, the UK, Switzerland and the Netherlands have announced their intention to apply a higher leverage ratio limit for systemically important banks, and the UK also plans to incorporate part of the countercyclical buffer into the leverage ratio.

16 For details see *The ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector*, where the section on the leverage ratio includes a passage on the macroprudential leverage ratio.

17 Articles 412(1) and 460(2) of the CRR.

18 Commission Delegated Regulation (EU) No. 2015/61 with regard to liquidity coverage requirement for credit institutions.

Czech banking sector.[19] Up to now, credit institutions have often applied a 15% outflow rate because of the difficulty of implementing this test. Given the large amount of retail deposits in the Czech banking sector (see section 3.1), this implies a relatively significant effect on outflows in the LCR denominator. However, the Commission regulation is to be amended and it is already clear that it will undergo further changes.

The implementation of the requirement for stable sources of funding in the form of the ratio of available to required sources of stable funding (the net stable funding ratio, NSFR) is behind schedule. The EBA is supposed to report to the European Commission by the end of this year on whether and how it would be appropriate to implement the NSFR requirement and identify potential impacts. The implementation date cannot be estimated at present.

Regulatory changes prepared by the Basel Committee

Planned changes in the international regulatory framework defined by the Basel Committee on Banking Supervision (BCBS) may also have major macroprudential effects. In its November 2014 report to the G20, the BCBS stated that that there was a need to reduce excessive variability in banks' regulatory capital ratios. The objective of this plan is to improve the consistency and comparability of the calculation of capital requirements and boost confidence in the risk-weighted exposure system. This is to be achieved by improving non-modelled approaches, reviewing modelling practices, setting an aggregate capital floor for modelling approaches and recalibrating the leverage ratio requirements. The review is to be comprehensive and cover all types of risks and exposures. The BCBS will also work on reducing the number of national discretions and enhancing bank transparency.

In connection with the above plan, the BCBS in December 2014 opened consultations on revisions to the standardised approach (SA) for credit risk. The current approach is based on the use of external credit ratings to determine risk weights. The aim is to replace such ratings with risk assessments based on key risk drivers. The risk weights on corporate exposures would range from 60% to 300% on the basis of corporate revenue and leverage. For retail exposures (consumer credit in particular), the criteria to qualify for the 75% preferential risk weight would be tightened. Weights on exposures secured by residential property would range from 25% to 100% on the basis of LTV and DSTI ratios (see section 4.4). Exposures secured by commercial property would be either treated as unsecured or risk-weighted on the basis of the LTV ratio. Risk weights on interbank exposures would range from 30% to 300% on the basis of a capital ratio and an asset quality ratio.

19 This test is needed in order to classify individual types of deposits in terms of their stability and to assign them with appropriate outflow rates.

4.3 THE SETTING OF THE COUNTERCYCLICAL CAPITAL BUFFER IN THE CZECH REPUBLIC

The countercyclical capital buffer ("CCB") is a macroprudential tool designed to increase the banking sector's resilience to cyclical risks associated with fluctuations in lending. The CNB sets the CCB rate on a quarterly basis. It was announced for the first time on 1 October 2014.[20] The CCB rate becomes legally binding on the institutions concerned upon the issuance of a provision of a general nature.[21]

Assessment of the current position of the Czech economy in the financial cycle

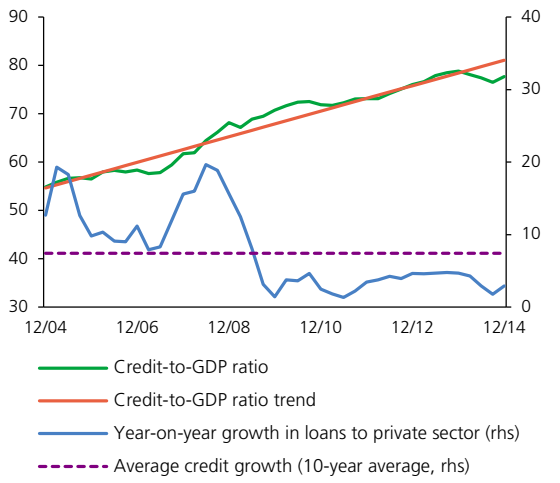
Overall growth in loans to the private sector responded only gradually to the economic recovery in 2014 and 2015 Q1. The annual growth rate of total loans to the private sector was 2.9% at the end of 2014, still below the long-term average (see Chart IV.16). The growth rate of the main component of total loans – bank loans – was 4.5% for households and 1.4% for non-financial corporations in 2014 (see Chart IV.17). It rose further in 2015 Q1. A slight increase can also be seen for loans provided by non-bank financial corporations engaged in lending, where the year-on-year growth stood at 3.4% for non-financial corporations and 2.1% for households at the end of 2014.[22] The growth rate of total loans in the non-financial corporations sector is being strengthened by continued growth in issuance of corporate bonds. The share of this type of financing in the total funds of the non-financial corporations sector has been increasing in recent years (see Chart II.28). However, the bond issuance pertains to a very limited number of firms, so its growth cannot be considered a sector-wide trend (issues of corporate bonds and related risks are discussed in more detail in section 2.2).

The ratio of credit to GDP, which the CNB is obliged to disclose under an ESRB recommendation, provides key information about the assessment of the current position of the economy in the financial cycle.[23] This ratio

CHART IV.16

Growth in loans to the private sector

(%)

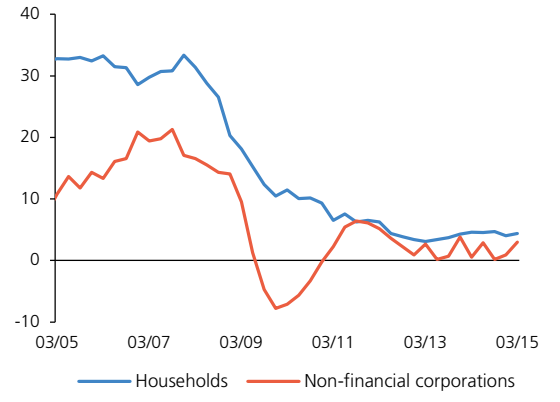


Source: CNB
Note: The total stock of credit to the private sector under BCBS methodology contains loans and bonds issued. The credit-to-GDP ratio trend is calculated using the HP filter and corresponds to indicator (3) in Table IV.3. The private sector comprises non-financial corporations, households and non-profit institutions serving households.

CHART IV.17

Year-on-year growth in bank loans

(%)



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

20 In accordance with CRD IV and its implementation into Czech law, the CNB took the opportunity to apply this macroprudential instrument before 2016, which is the binding date for its introduction into regulatory practice throughout the EU.

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

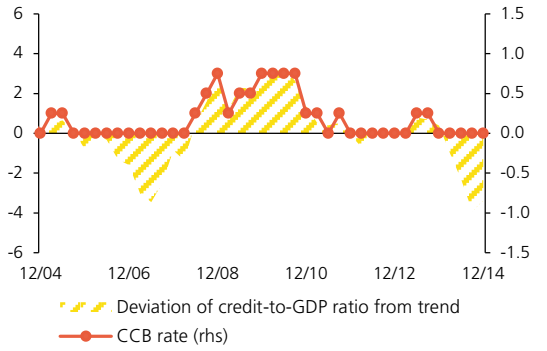
22 However, the base period of 2013, to which the year-on-year changes in this text relate, was significantly below average in the case of loans provided by non-bank financial corporations to non-financial corporations. Loans from non-bank financial corporations are dealt with in more detail in section 3.1.

23 According to the BCBS and an ESRB recommendation (*Recommendation (ESRB/2014/1) on guidance to EU Member States for setting countercyclical buffer rates*), the need to introduce a non-zero CCB rate is assessed on the basis of the deviation of the credit-to-GDP ratio from its long-term trend. This deviation is an overall indicator of the build-up of cyclical risks in the economy. In the ESRB recommendation, credit is defined as total loans (i.e. not only bank loans) to the private sector plus debt securities issued. In 2014 Q2, the credit-to-GDP ratio was greatly affected by methodological changes made to the national accounts, specifically the switch to the ESA 2010 methodology. Due to insufficient revision of the national accounts data, which contain information on total credit as defined by the BCBS, the current time series of the credit-to-GDP ratio only takes into account the revised GDP series. Conversely, the time series of total credit does not yet reflect changes associated with the switch to the new standards and the new BPM6 balance of payments manual (in particular, it does not reflect the switch in the reporting of cross-border inter-company loans from a net basis to a gross basis; this increases the previous stock of total

CHART IV.18

Assessment of the need to set a non-zero countercyclical capital buffer rate

(%)



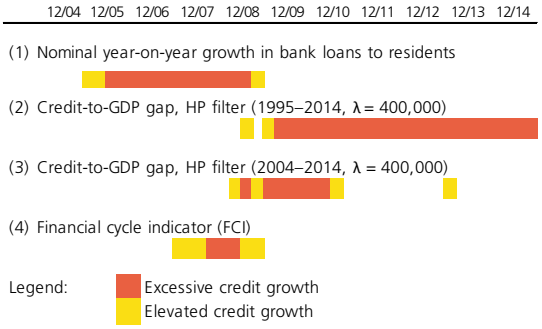
Source: CNB

Note: This is an ex-post assessment, not an assessment in real time. The total stock of credit to the private sector under BCBS methodology contains loans and bonds issued. The credit-to-GDP ratio trend is calculated using the HP filter and corresponds to indicator (3) in Table IV.3. The private sector comprises non-financial corporations, households and non-profit institutions serving households.

TABLE IV.3

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

(%)



For indicator 1: y-o-y growth > 10 pp for elevated growth, > 15 pp for excessive growth. **For indicators 2–3:** credit-to-GDP gap > 2 pp for excessive growth, > 0.7 pp for elevated growth. **For indicator 4:** excessive growth for FCI > 0.5, elevated growth for FCI > 0.3.

Source: CNB

stood at 77.7% in 2014 Q4 (see Chart IV.16) and its deviation from the long-term trend was 6.0 pp. These values would imply a CCB reference rate of 1.25%. However, the information value of this indicator for the Czech Republic is greatly affected by the removal of bad loans from banks' balance sheets in the late 1990s and in the following decade, which resulted in a need to use alternative methods to set the CCB rate. In line with the ESRB recommendation, one option is to use an additional deviation of the credit-to-GDP ratio, one whose calculation is based on a shorter time series excluding the period during which bad loans were written off (i.e. the post-2004 time series). The deviation from the long-term trend calculated in this way is -3.4 pp, implying a zero CCB rate (see Chart IV.18 and Table IV.3).

The setting of a zero CCB rate is consistent with the aggregate financial cycle indicator (FCI), which the CNB uses to some extent to complement the recommended credit-to-GDP ratio. The FCI combines signals of cyclical risks from various segments of the economy. These signals cover both supply and demand factors (such as credit growth, property prices, the speed of private sector borrowing and interest rate spreads).[24] The currently observed FCI levels suggest that the financial cycle remains close to its trough and its recovery is gradual (see Chart IV.19 and Table IV.3). The individual components of the FCI are mostly in line with the overall economic situation and also suggest the onset of a recovery phase. Residential property prices recorded a slight increase in 2014, but the analyses indicate that the growth is still consistent with economic fundamentals. According to the *Baseline Scenario* of the current round of stress tests, continuing growth is expected in 2015. However, the growth should remain subdued and no major pick-up is expected, nor are any price bubbles expected to form (see sections 2.4 and 4.4). The speed of private sector borrowing relative to income is still low by comparison with the pre-crisis period, and total debt service does not currently represent an excessive burden overall.[25] Domestic equity indices were mostly flat in 2014, merely adding to the evidence of the absence of an excessively optimistic investment environment in this period. Within two months of the announcement of quantitative easing by the ECB in January 2015, however, the domestic equity index increased by around 9% (see Chart II.6). The evolution of banks' credit standards is a major factor indicating a shift of the economy to an expansionary phase of the business cycle. However, it has not yet been accompanied by changes in other types of cyclical risks. It is therefore appropriate to use instruments other than the countercyclical capital buffer to mitigate this source of risk (see section 4.4).

Overall, the relevant indicators can be assessed as suggesting that the position of the economy in the financial cycle did not move significantly

credit by more than CZK 0.5 billion). The long-term trend is calculated using the HP filter with a smoothing parameter of 400,000.

24 The financial cycle indicator (FCI) methodology is described in detail in the thematic article *An Indicator of the Financial Cycle in the Czech Economy* published in FSR 2013/2014.

25 However, this does not necessarily apply to specific segments of the credit market (see sections 4.1 and 4.4).

towards rapid growth in the period since the previous setting of the CCB rate (18 March 2015). The Czech economy as a whole is displaying a low level of risk associated with excessive credit creation. Given also that the level of cyclical risks remained broadly unchanged from the previous quarter, the CNB does not consider it necessary to set a non-zero CCB, so the rate will be left at its current level of 0%. The forecast for future credit growth in the *Baseline Scenario* of the current round of stress tests and for developments in relevant markets suggests that a zero CCB rate will probably be applied in the next two years as well. However, this probability has decreased as a result of a recovery in credit growth, an easing of credit standards and a slight improvement in investment sentiment.

4.4 REGULATION OF RISKS ASSOCIATED WITH EXPOSURES TO THE PROPERTY MARKET

Section 2.4 described current developments in property markets and identified risks associated with growth in residential property prices. This section assesses these risks using a formalised procedure. It also evaluates credit standards applied to new loans secured by property. Given the risks identified, it then presents a recommendation on the management of risks associated with the provision of retail loans secured by residential property.

4.4.1 ASSESSMENT OF PROPERTY PRICE SUSTAINABILITY

An assessment of the degree of overvaluation/undervaluation of property prices is important for evaluating the risks associated with exposures to the property market. In the case of the residential property market, the assessment is based on apartment prices. These prices are the most volatile in the residential property segment and may thus show the highest degree of overvaluation or undervaluation during the financial cycle.

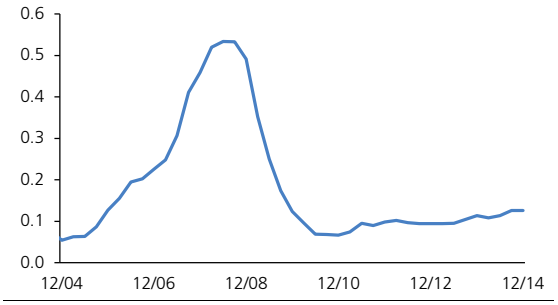
In this Report, the CNB assesses apartment prices for the first time on the basis of a formalised approach combining the results of four statistical and econometric models.[26] Using this method, a modest overvaluation of 2.5% was estimated for apartment prices as of 2014 Q4.[27] Three of the four estimates entering the aggregate assessment indicate apartment price overvaluation in the range of 3.3%–4.2% (see Chart IV.20 and Table IV.4). Undervaluation of 1% was estimated only by the price-to-rent method, where the results are affected by a strong increase in rents in 2014. The results of this aggregate model-based approach to property

26 For details see the thematic article *A Comprehensive Method for House Price Sustainability Assessment* in this Report.

27 The thematic article assesses equilibrium apartment prices as of 2014 Q2, until when data on apartment transaction prices based on tax returns published by the CZSO are available. This section assesses apartment prices as of the end of 2014. The data on transaction prices based on tax returns were extended using data on transaction prices from a CZSO survey. On the one hand this extension of the time series allows us to assess the current data, but on the other hand the results may be affected by different dynamics of prices estimated by the CZSO from different data sources.

CHART IV.19

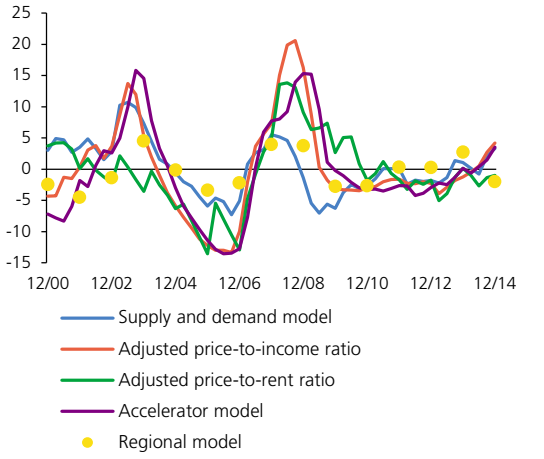
Aggregate financial cycle indicator
(0 minimum, 1 maximum)



Source: CNB
Note: The FCI methodology is described in the thematic article *An Indicator of the Financial Cycle in the Czech Economy*, FSR 2013/2014.

CHART IV.20

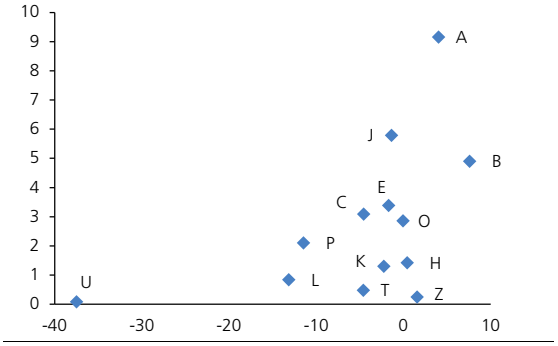
Apartment price gaps according to various methods
(%; positive values indicate overvaluation, negative values undervaluation)



Source: CZSO, IRI, MRD, EC, CNB calculation

CHART IV.21

Apartment price gaps – regional comparison
(%; x-axis: price gaps from panel regression; y-axis: price gaps from HP filter)



Source: CZSO, CNB calculation
Note: Price gaps from the panel regression are calculated on the basis of data for 1999–2015. Price deviations from the HP filter are calculated with lambda = 1,600. City abbreviations: A – Prague, B – Brno, C – České Budějovice, E – Pardubice, H – Hradec Králové, J – Jihlava, K – Karlovy Vary, L – Liberec, O – Olomouc, P – Plzeň, T – Ostrava, U – Ústí nad Labem, Z – Zlín.

TABLE IV.4

Apartment price gaps according to various methods as of the end of 2014
(%)

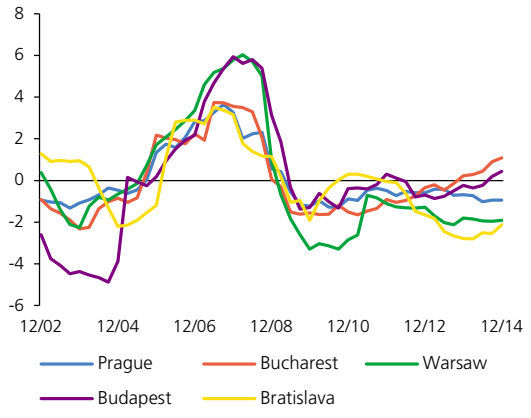
Main methods	Degree of undervaluation/overvaluation
Supply and demand model	3.3
Accelerator model	3.5
Adjusted price-to-income ratio	4.2
Adjusted price-to-rent ratio	-1.0
Overall	2.5

Supporting methods	Degree of undervaluation/overvaluation
Statistical assessment (HP filter)	2.7
Regional model, average for regions	-2.0

Source: CNB calculations

CHART IV.22

Office price gaps
(%; price gaps from panel regression)



Source: Jones Lang LaSalle, CNB calculation

price assessment are confirmed by a statistical assessment method based on the HP filter, which indicates apartment price overvaluation of 2.7%.

However, the assessment of equilibrium apartment prices at national level may mask differences between regions (see section 2.4). For this reason, the CNB also works with a regional apartment price assessment model,[28] which estimates the average price undervaluation in the regions at 2%. The results show that the overvaluation/undervaluation in some regions is linked with both the absolute level and dynamics of prices. The highest overvaluation was recorded in Prague (A) and Brno (B), whereas prices were most undervalued/least overvalued in Ústí nad Labem (U). The results of the model-based approach and the statistical approach based on the HP filter are again essentially consistent for the individual regions (see Chart IV.21).[29]

The assessment of commercial property prices focuses on office property prices, for which the largest risks were identified (see section 2.4). The CNB assesses equilibrium office property prices using an error-correction model applied to data on office property in Central European countries.[30] Office property prices in the Czech Republic were estimated as slightly undervalued by 1% in 2014 Q4 (see Chart IV.22). The Czech Republic thus ranks between those countries with slightly overvalued office property (Hungary and Romania) and those with more strongly undervalued prices (Poland and Slovakia).

4.4.2 ASSESSMENT OF CREDIT STANDARDS FOR NEW LOANS SECURED BY RESIDENTIAL PROPERTY

Sustained growth in property prices becomes a risk to financial stability if it is accompanied by an easing of credit standards. This can happen through the provision of loans secured by residential property with high loan-to-value ratios or through more benevolent requirements as regards the creditworthiness of loan applicants. These credit standards are normally measured using the LTV (loan-to-value) and LTI (loan-to-income) ratios. Standards applied to loans for house purchase were relaxed during 2014 and 2015 Q1 (see section 2.3). To assess the degree of easing of credit standards for loans secured by residential property, however, we need to know the LTV and LTI distributions of new loans secured by residential property. To this end, the CNB at the start of 2015 conducted

28 See Hlaváček, M., Komárek, L. (2011): *Regional Analysis of Housing Price Bubbles and Their Determinants in the Czech Republic*, Czech Journal of Economics and Finance, No. 1, 2011.

29 The undervaluation estimated on the basis of panel regression is suspiciously high only for Ústí nad Labem (U). (This strong undervaluation also drives down the average undervaluation in 2014 in Chart IV.20.) Compared to the HP filter, the panel regression also reduces the degree of overvaluation in Prague (A) and Jihlava (J). Importantly, none of the methods indicates overvaluation of greater than 10% in any region.

30 For the calculation method, see the thematic article *Office Property in Central European Countries* in FSR 2013/2014.

a survey among banks regarding the LTV and LTI category structure of new loans provided in 2014.[31]

In 2014, the distribution of new loans recorded a considerably higher share of loans in the 80%–90% LTV category than the LTV distribution of stock of loans (see Chart IV.23). The LTV distribution of new loans was significantly skewed, as the mean LTV was much lower than the LTV for the most frequently granted loans.[32] This indicates the application of internal LTV limits by banks.

The LTV distribution of new loans also differed according to bank size (see Chart IV.24). High LTV levels for new loans (above 90%) were recorded primarily by large banks and building societies. In the case of building societies, this may be partly due to their different business model under the building savings legislation.

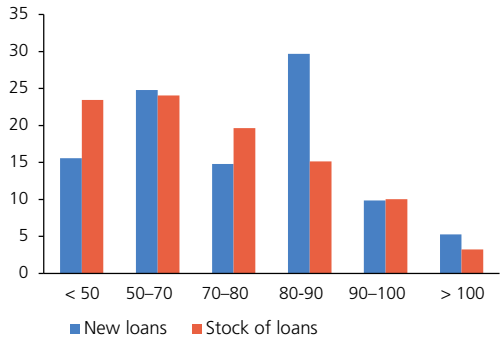
The LTI distribution of new loans was U-shaped – loans with very low LTIs (below 3) or very high LTIs (above 5.5) were the most frequent. In addition, the proportion of new loans with high LTIs increased in 2014. If loans with high LTVs simultaneously had low LTIs, the credit risk of loans with high LTVs would be low. The survey also reveals that there was a positive relationship between LTI and LTV levels in the structure of new loans in 2014 (see Chart IV.25). With increasing LTI, the share of loans with LTVs below 70% decreased and, conversely, the proportion of loans with LTVs between 80% and 100%, and partly also of loans with LTVs above 100%, increased. With increasing LTI, the average loan amount also increased,[33] whereas average income did not differ much across LTI levels. However, this phenomenon may be partly due to different housing affordability across regions,[34] as households in regions with higher house prices may take out larger loans (see section 2.4).

Overall, the survey of the LTV and LTI structure of new loans suggests a modest shift towards easier credit standards. As property prices are still rising slowly and remain broadly in line with fundamentals, this easing does not pose any direct risk to financial stability. However, given the potential risks associated with the future evolution of property prices (see section 2.4) and loan dynamics (see section 4.3), the CNB deems it necessary to introduce instruments to counteract the risk of feedback between property price growth and growth in lending. For this reason, the CNB will in June 2015 issue a recommendation on the management

31 Fifteen banks, accounting for 98.3% of all loans for house purchase provided in 2014, took part in the survey.
32 The distribution is skewed to the left, i.e. there are more outliers to the left than to the right of the mean, and most of the values are to the right of the mean. The skewed LTV distribution of new loans means, among other things, that the mean LTV is not very appropriate for describing the market situation. A more suitable indicator is the median LTV, which for new loans reached a relatively high level of 76.5% in 2014 (versus a mean LTV of 63.1%). Half of the loans provided in 2014 thus had LTVs above this level.
33 The amount of loans in the LTI > 5.5 category was 2.2 times higher than that in the LTI < 3 category. With increasing LTV, the amount of loans increased up to LTV 60%–70%, then was stable, and then started falling again from LTV 80%–90%.
34 In some regions, higher apartment prices are not always sufficiently offset by higher average wages.

CHART IV.23

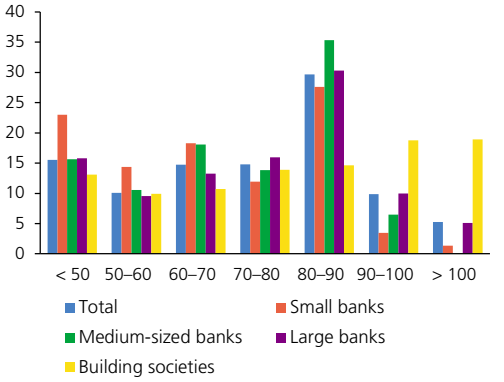
Comparison of the LTV distribution of new loans and the stock of loans
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB

CHART IV.24

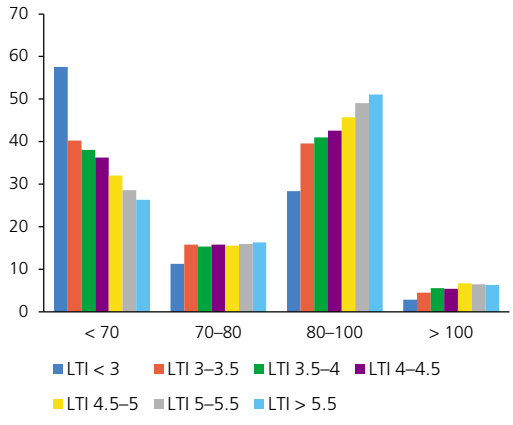
Distribution of new loans by LTV and bank size
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB
Note: The breakdown by bank size does not necessarily correspond to the size of the market shares for loans for house purchase.

CHART IV.25

Relationship between LTV and LTI for new loans
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB

of risks associated with the provision of retail loans secured by residential property, which is described in the next section.

4.4.3 RECOMMENDATION ON THE MANAGEMENT OF RISKS ASSOCIATED WITH THE PROVISION OF RETAIL LOANS SECURED BY RESIDENTIAL PROPERTY

The CNB is issuing preventive macroprudential recommendations for credit institutions directed against potential growth in risks in the area of loans secured by residential property

The CNB has prepared a recommendation (or rather a set of recommendations) for credit institutions providing retail loans secured by residential property. This recommendation is based on a recommendation of the European Systemic Risk Board (ESRB),[35] recommendations of other international authorities and EU legislation.[36] This CNB recommendation pursues one of the major intermediate objectives of macroprudential policy, namely to mitigate and prevent excessive credit growth and leverage. It also takes into account prudential principles and recommended procedures for meeting the objectives of microprudential supervision and consumer protection. Similar measures are in place in other countries. A summary of the application of such instruments inside and outside the EU was provided in FSR 2013/2014 (pp. 98–100).[37]

The recommendations are intended to prevent any escalation of risks in the banking sector due to credit and property market developments

In previous Financial Stability Reports, the CNB reported that the Czech credit and residential property markets were stable and were not a direct source of risks to financial stability. The CNB also stated that this situation was not necessarily permanent and it would therefore prepare and legislate for tools preventing the potential build-up of systemic risks in the banking sector. Such build-up usually occurs as a result of growth in loans secured by residential property combined with a concurrent easing of the interest rate or non-interest rate component of the credit conditions and rising residential property prices. The CNB regularly analyses loans secured by residential property and the property market situation. Where it identifies rising and increased risks, it is ready to activate the relevant instruments to reduce the financial sector's vulnerability to potentially adverse developments in economic activity and conditions on the property market with negative impacts on financial stability in the Czech Republic.

The recommendations include quantitative limits on the LTV ratio and qualitative criteria to ensure that credit standards comply with the criteria of sufficient tightness and prudence

The main instruments listed in the ESRB recommendation for meeting the above property financing-related intermediate objective include an upper limit on the LTV ratio. The LTV limit is set so as to reflect the possible volatility of property prices and the potential for such prices to fall during recessions or crises. As a result, when purchasing property, borrowers will

35 ESRB Recommendation on Intermediate Objectives and Instruments of Macroprudential Policy (ESRB/2013/1).

36 Financial Stability Board (2012): *FSB Principles for Sound Residential Mortgage Underwriting Practices*; European Banking Authority (2013): *Opinion of the European Banking Authority on Good Practices for Responsible Mortgage Lending*; Directive 2014/17/EU on Credit Agreements for Consumers Relating to Residential Immovable Property and Amending Directives 2008/48/EC and 2013/36/EU and Regulation (EU) No 1093/2010.

37 In 2014, macroprudential measures targeted at property financing-related risks were adopted, for example, in Slovakia, Belgium, Denmark and Estonia. A complete list of macroprudential measures in EU countries is available in the *Macro-prudential policy actions* section of the ESRB website (www.esrb.europa.eu).

not enter into commitments that significantly exceed the collateral value, and even in bad times the reduced property value will still serve as sufficient collateral. The ESRB recommendation also states that Member States should select and apply any additional macroprudential instruments taking into account their effectiveness and efficiency, to achieve each of the intermediate objectives. As regards the risks associated with the provision of loans secured by residential property, the instruments should ensure that credit standards comply with the criteria of sufficient tightness and prudence. Such instruments include limits on the LTI and debt service-to-income (DSTI) ratios.

The recommendations are intended for banks, foreign bank branches and credit unions

An assessment of information gathered by the CNB in the course of its supervisory work over the last two years reveals that credit institutions operating in the Czech Republic are mostly prudent when providing loans secured by residential property. However, there are signs of some easing of credit standards in this segment. Foreign experience indicates that preventive measures for counteracting growth in risks associated with the provision of loans secured by residential property are more effective in a situation where the risks on the credit and property markets are still low. The CNB is therefore issuing a set of quantitative and qualitative recommendations for banks, foreign bank branches and credit unions. These recommendations, described below, define correct procedures and standards for the provision of loans secured by residential property. They are aimed at enhancing existing internal risk management systems in such institutions and encouraging a prudent approach to providing loans secured by residential property.

Recommendation A: LTV limits for new loans

Recommendation A is focused on compliance with LTV limits for new loans. It includes a limit on new loans secured by residential property with a high LTV ratio relative to total new loans of this kind provided in a certain period. Specifically, new loans secured by residential property with an LTV of more than 90% should not exceed 10% of the total amount of such loans provided in any given quarter. A limit of 100% is also applied to the LTV ratio for any individual loan. In addition, circumvention of the above limits through the concurrent provision of unsecured consumer credit relating to the residential property concerned is defined as unacceptable practice. The recommendation concerning the LTV ratio is preventive in nature. It does not preclude institutions from providing loans with a higher LTV in justified cases, i.e. in cases where other indicators considered in the application assessment process together indicate a high probability of the loan being repaid.

Recommendation B: Assessment of clients' ability to service loans from their own resources

In addition to *recommendation A* regarding the LTV ratio, the CNB provides several other recommendations to credit institutions. Some of them concern the principles of prudent provision of retail loans. Recommendation B is directed at the assessment of clients' ability to service their loans and to withstand increased stress in the event of adverse economic developments. When providing retail loans secured by residential property, institutions should prudently assess indicators of clients' ability to service loans from their own resources and set internal limits for such indicators. They can do so by, for example, setting limits on LTI, DSTI or similar ratios in their internal methodologies. Institutions

should also carefully assess clients' ability to service their loans under adverse conditions (i.e. they should stress-test clients' ability to repay), especially in the event of a sizeable fall in income or a rise in lending rates. This is particularly important in the current period of historically low nominal interest rates, which may create an illusion of favourable debt service in the long term. In such times, it is essential to adopt a conservative approach taking into account the possibility of a pronounced increase in lending rates in the medium to long term.

Recommendation C:
Loan term and repayment schedule

The experience of other economies shows that an excessive easing of credit standards can become a source of systemic risk. This should be prevented by *recommendation C*, according to which the term of the loan should reflect the lifetime of the property and the expected remaining period of economic activity of the client and, as a rule, should not exceed 30 years. Owing to the risk of circumvention of recommendation A, it is stipulated that the term of unsecured consumer credit provided to clients that have a loan secured by real estate should not exceed 8 years. Institutions should not provide retail loans secured by residential property with a non-standard repayment schedule leading to a shift of the client's credit commitments to a later period. This refers to loans negotiated with partial or full deferral of interest or principal payments, with gradually rising payments, with a temporarily reduced interest rate, or with a less frequent than monthly repayment schedule. The provision of such loans may give the client the illusion of easy repayment and defers risks to the future. In bad times, these deferred risks manifest themselves much more strongly.

Recommendation D:
Approach to increasing loans when refinancing

Increases in principal during loan refinancing are a potential mechanism of excessive easing of credit standards. *Recommendation D* therefore states that if institutions refinance a loan secured by residential property and simultaneously increase the outstanding amount of principal, they should proceed in the same manner as in the case of new loans. If they increase the outstanding amount of a refinanced loan by more than 10% or CZK 200,000, they should separately assess compliance with all the prudential risk management principles and determine the current value of the property serving as collateral.

Recommendation E:
Lending through intermediaries

In *recommendation E*, the CNB points to the need to apply a prudent approach when working with loan intermediaries. Institutions should consider the risks associated with the different interests of intermediaries, as these also create potential for an excessive easing of credit standards. For loans negotiated by intermediaries, institutions should separately monitor credit risk and compare it with that on other loans secured by residential property.

Recommendation F:
Financing of buy-to-let purchases of residential property

The final recommendation, *recommendation F*, focuses on the risks associated with the growing interest in providing loans to finance buy-to-let purchases of residential property. For credit risk management purposes, institutions are recommended to identify and separately monitor the different characteristics of owner-occupied and buy-to-let portfolios of loans secured by residential property.

The CNB will regularly assess compliance with the above recommendations. The results will be published in the Financial Stability Report. If increased risks to financial stability are identified, the CNB will be ready to tighten the relevant parameters of individual recommendations, to expand the recommendations as a whole, or to convert them into supervisory benchmarks.

An assessment of credit institutions' compliance with the recommendations will be published each year in the Financial Stability Report

4.5 RISKS ASSOCIATED WITH SOVEREIGN EXPOSURES

The CNB has repeatedly indicated in its Financial Stability Reports that it closely monitors the build-up of sovereign exposures in domestic banks' balance sheets.[38] This is due mainly to risks stemming from links between the banking and government sectors.[39] The share of all government bonds (91% of which are domestic bonds) in the total assets of credit institutions in the Czech Republic was up slightly year on year at the end of 2014 (by 0.6 pp to 16.6%). The share of domestic government bonds in assets remained stable (15.2%). However, it is above average by international comparison (see Chart IV.26).

Domestic credit institutions face sovereign exposure concentration risk

The CNB has prepared an internal methodology (a new prudential supervisory tool) for reviewing and assessing the risk of systemic concentration of sovereign exposures under Pillar 2. It conducted a public consultation on the draft version in spring 2015.[40] The tool is based on the fact that CRD IV requires credit institutions to ensure consistent and effective management of concentration risk in their risk management systems. Concentrated sovereign exposures are no exception.[41] According to EBA guidelines, national supervisory authorities should assess concentration risk management.[42] When performing supervision, the CNB will therefore review and assess at least once a year, and from now on according to the methodology described below, whether the arrangements, strategies, procedures and mechanisms the credit institution has in place do in fact ensure proper management and coverage of this risk.[43] One of the intermediate objectives of macroprudential policy recommended by the ESRB also focuses on exposure concentration.[44]

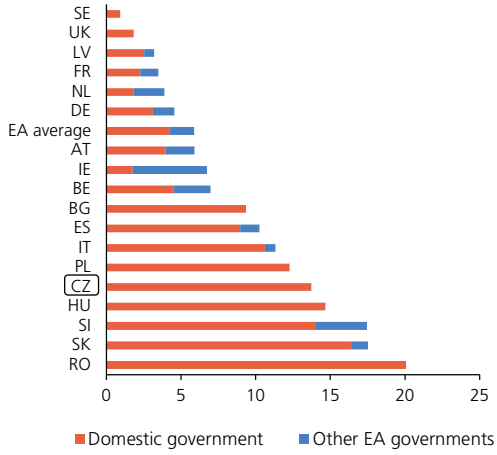
The CNB has prepared a supervisory tool in the form of a methodology for checking the proper management of sovereign exposure concentration risk

This tool is neither a new regulation nor a national discretionary requirement

CRD IV requires institutions to ensure consistent and effective management of concentration risk; national supervisory authorities assess management of this risk

CHART IV.26

Share of government bonds in MFI* balance sheets
(% of assets of MFIs*)



Source: ECB
Note: Data as of March 2015. For banks in non-euro area countries, euro area government bonds are not included, as they do not offer a direct alternative to domestic government bonds. * Including credit institutions and money market funds, excluding central banks.

38 In this section, "credit institution" means an institution having its registered office in the Czech Republic, i.e. a bank pursuant to Act No. 21/1992 Coll., on Banks, or a credit union pursuant to Act No. 87/1995 Coll., on Credit Unions.
39 For more information on the risks stemming from the relationship between the banking and sovereign sectors, see the article *Fiscal Sustainability and Financial Stability* in FSR 2012/2013.
40 CNB (2015): Consultation paper: Internal CNB methodology for the review and assessment of sovereign exposure concentration risk.
41 Articles 30 and 42 of Decree No. 163/2014 Coll., on the performance of business of banks, credit unions and investment firms.
42 According to EBA guidelines (Guidelines on common procedures and methodologies for the supervisory review and evaluation process, article 154), supervisory authorities should assess the degree of concentration of exposures to individual countries, including sovereign exposures, as part of the Pillar 2 supervisory process.
43 Article 25c of Act No. 21/1992 Coll., on Banks, Article 21a of Act No. 87/1995 Coll., on Credit Unions, Article 135b of Act No. 256/2004 Coll., on Capital Market Undertakings.
44 ESRB recommendation on intermediate objectives and instruments of macroprudential policy (ESRB/2013/1), page 9, second paragraph: *"to limit direct and indirect exposure concentrations, taking into account their degree of riskiness. Direct concentration risk arises from large exposures to the non-financial sector (e.g. the housing market, sovereigns)…"*

The tool motivates institutions to treat systemically important sovereign exposures prudently

The purpose of the tool is to motivate credit institutions to adopt a prudent approach to sovereign exposures that are starting to take on systemic importance. In simple terms, sovereign exposures are exposures to individual governments and their agencies in EU Member States in all currencies, to which exemptions apply under Pillar 1 (the exemptions for sovereign exposures are described in more detail in FSR 2013/2014, p. 104).[45] The methodology defines an important sovereign exposure as an exposure held by a credit institution with a minimum ratio of 100% to its eligible capital. It becomes systemic if the assets of credit institutions with important exposures exceed 5% of their total assets. Each year, the CNB assesses whether sovereign exposures have reached systemic importance according to this rule and publishes this information in the Financial Stability Report.

The internal methodology divides a sovereign exposure into a below-limit and above-limit part and sets an additional capital requirement for the above-limit part when increased risk is identified

The main feature of the new supervisory tool is a percentage *limit* on each sovereign exposure. It divides the exposure into a below-limit and above-limit part. The limit is a function of the sovereign risk indicator (ISR) estimated by the CNB (see Box 6). The ISR is key to the calculation not only of the sovereign exposure limit, but also of any potential capital requirements. Simply put, the ISR is a variable lying within the range of 0%–100% indicating the risk of default on a monitored sovereign exposure (see Box 6). The sovereign exposure limit ranges between 222% and 0% of eligible capital.[46] The limit decreases with an increasing riskiness of the sovereign exposure. If the ISR is 0%, the limit is at its upper bound of 222% of eligible capital, whereas if the ISR is 100%, the limit is at the lower bound of zero. If sovereign exposures are considered to be safe, the limit is more than double the eligible capital.

The CNB would indicate any additional capital requirement well in advance

The CNB will require credit institutions to meet an additional capital requirement for the above-limit part of the exposure. However, this will apply only where it finds in a concentration risk management review conducted in individual credit institutions that the *coverage is insufficient* with regard to the riskiness of the sovereign exposure.

The CNB will set additional capital requirements for institutions at the *three-year horizon*, at the earliest when the ISR outlook at this horizon exceeds a "soft" threshold of 5% and the results of an expert analysis[47] confirm that an additional capital requirement is necessary.[48] If a *"hard"* ISR threshold of 8% is exceeded, it will be indicated that an additional capital requirement must be met unconditionally at the three-year

45 A similar sovereign exposure definition is given in Article 4(61) of Directive 2014/65/EU on markets in financial instruments (MiFID II) ("sovereign debt").

46 The upper bound of the limit of 222% at an ISR of 0% corresponds to the bank's ability to cover the loss with capital should the issuer default and should 45% of the exposure be written off (LGD = 45%). As the limit decreases linearly between the two ISR bounds, its amount in CZK billions can be expressed for any ISR value as *((1 - ISR) * eligible capital) / 0.45*.

47 The expert analysis includes an assessment of the contributions of individual variables to the excess over the "soft" threshold (see Table IV.1 Box) and an evaluation of other macroeconomic conditions that cannot be modelled.

48 If the expert analysis does not confirm that an additional capital requirement is necessary, the CNB will step up its monitoring. Institutions will have the duty to manage risks with increased prudence.

horizon. The ISR outlook will be published every year in the Financial Stability Report.

Three years after the additional capital requirement is indicated, the CNB will set the above-limit part of sovereign exposures for individual institutions. Potential additional capital requirements relating to the above-limit part of the exposures will be applied. The risk weight will be derived from the standard formula set out in Article 153 of the CRR. The PD parameter will be replaced by the *current* ISR value (not the original ISR outlook obtained from the stress test). Furthermore, an LGD of 45% and a maturity of 2.5 years will be applied.[49]

If a credit institution already creates a capital requirement to cover risk stemming from the sovereign exposures concerned on the basis of the IRB approach under Pillar 1 or on the basis of its own risk management system under Pillar 2, the CNB will take this into account. The already allocated capital will be subtracted from the additional capital requirement for the coverage of concentration risk arising from above-limit sovereign exposures.

BOX 6: THE SOVEREIGN RISK INDICATOR AND THE PUBLIC FINANCE STRESS TEST METHODOLOGY

The ISR is a variable taking values in the range of 0%–100% which aims to assess the risk of sovereign exposure default. For the purposes of estimating the ISR, sovereign exposure default means a write-off of the exposure, government debt restructuring or the launch of an international economic aid programme, for example by the IMF. The ISR is constructed on the basis of a statistical analysis of historical observations of debt crises and selected variables. These explanatory variables can be divided into several categories. The first category is made up of fiscal variables describing the performance of public finances – the general government primary balance and general government debt and its maturity, currency and territorial structure. The second category comprises macroeconomic variables affecting public finances – real economic growth, the current account balance and the government bond yield. The last category contains additional indicators reflecting the soundness of the financial system (a binary variable indicating whether the economy is going through

TABLE IV.1 BOX

Construction of the sovereign risk indicator

	Critical limit	fpr (%)	fnr (%)	Weight (%)
Macroeconomic variables				
Real GDP growth (%)	< -2.3	4.8	65.0	6.3
Current account balance (% of GDP)	< -1.8	47.6	10.0	8.9
Gross national savings (% of GDP)	< 19.3	26.5	35.0	8.1
External debt (% of GDP)	> 99.6	18.0	56.0	5.5
Difference between real GDP growth and real GB yield (pp)	> 6.3	9.0	69.3	4.5
Fiscal variables				
Government debt (% of GDP)	> 64.7	28.0	60.0	2.5
Primary balance (% of GDP)	< -3.2	17.1	45.8	7.8
10Y government bond yield (%)	> 10.8	30.5	34.1	7.4
Government debt maturing within one year (% of GDP)	> 19.0	23.9	62.3	2.9
Share of government debt maturing within one year (%)	> 21.7	52.7	24.6	4.8
Share of foreign currency debt (%)	> 27.1	31.0	47.2	4.6
Share of non-residents in debt holdings (%)	> 34.9	49.9	20.2	6.3
Institutional variables				
Government effectiveness (WGI score)	< 1.0	33.9	16.8	8.3
Political stability (WGI score)	< 0.8	40.4	13.4	7.8
Rule of law (WGI score)	< 1.2	44.9	10.5	7.5
Banking crisis	> 0	6.4	75.0	3.9
Past sovereign defaults	> 0	21.5	65.0	2.8

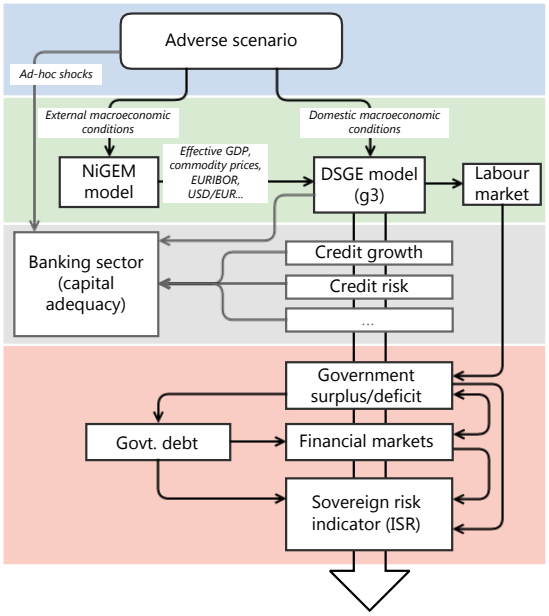
Source: CNB; for other sources see footnote 52

Note: fpr (fnr) stands for false positive (negative rate). The symbol > (<) denotes that a higher (lower) variable means the critical limit has been exceeded and increased risk is indicated. Higher WGI scores mean higher institutional quality. The auxiliary composite indicator *CI* is the sum of the weights of variables that are above their thresholds. The ISR is subsequently calculated as $ISR = exp(-8.1+10.1CI)/(1+exp(-8.1+10.1CI))$.

49 The actual values of the explanatory variables for the previous year, known as of the end of March, will be used to calculate the current ISR value. Where final data are not available, preliminary data will be used. In 2015, for example, the current ISR value would be determined using the values in column 2 of Table IV.5 (header "2014").

CHART IV.1 BOX

Public finance stress test diagram



Source: CNB

a financial sector crisis), external debt, past debt defaults and indicators of government effectiveness, political stability and rule of law.[50]

The relationships between sovereign exposure default and the explanatory variables are modelled using the noise-to-signal method, which is used, for example, by the European Commission to construct public debt crisis early warning indicators.[51] Using data from more than 50 countries between 1980 and 2014,[52] a critical limit is found for each variable monitored. This limit divides default and non-default observations in such a way that it minimises the sum of the false positive rate (*fpr*) and the false negative rate (*fnr*).[53] Exceeding the critical limit can be regarded as a warning signal. A higher number of warning signals for a higher number of variables means a higher risk of default. A composite indicator is constructed from all the observed signals using a weighted average where each signal is weighted by its ability to distinguish between default and non-default observations (*1-fpr-fnr*). The composite indicator is then recalibrated to the ISR using logistic regression (see Table IV.1 Box).

Projections of the main variables entering the ISR are obtained using a public finance stress test.[54] In the context of the current framework for regular stress testing at the CNB, the public finance stress test is a system of interconnected models simulating individual parts of the economy and their effect on public finances. A simplified diagram of the test is shown in Chart IV.1 Box.

Data on the state of the economy at the end of the previous year are the starting point of the test. Subsequent developments over

50 Past debt defaults are represented by a binary variable indicating whether the issuer has defaulted in the past ten years. The government effectiveness, political stability and rule of law indicators are taken from the World Bank's Worldwide Governance Indicators database.

51 See Berti, K., Salto, M. and Lequien, M. (2012): *An Early-Detection Index of Fiscal Stress for EU Countries*, European Economy, Economics Papers 475, December 2012.

52 The data for the ISR calibration are taken from the databases Economist Intelligence Unit Country Data, International Monetary Fund IFS and GFS, World Bank Worldwide Governance Indicators and Moody's Sovereign Default and Recovery Rates and from the articles Emanuele, et al. (2011): *Assessing Fiscal Stress*, IMF Working Papers; Cruces, J. J., and Trebesch, C. (2013): *Sovereign Defaults: The Price of Haircuts*, American Economic Journal: Macroeconomics 5(3); Reinhart, C. M., Rogoff, K. S., and Savastano, M. A. (2003): *Debt Intolerance*, Brookings Papers on Economic Activity 34. The sample of countries consists mainly of EU and OECD member countries. Countries with a high proportion of official creditors (the USA, Japan, the UK and Switzerland) were left out of the sample.

53 The false positive (negative) rate is the ratio of the number of false positive (negative) signals to the number of all actual negative (positive) observations. In this case, a default observation/signal is regarded as "positive". It is considered an error if the variable exceeds (does not exceed) the critical limit when default subsequently did not (did) occur.

54 Some variables (for example from the "institutional variables" category) are not projected using the stress test and the latest observation is assumed for the entire test horizon.

the three-year horizon are derived from a stress scenario that contains assumptions about adverse shocks to the main macroeconomic variables and other additional shocks reflecting currently perceived risks, especially market risk. Some of these macroeconomic variables directly enter the calculation of the ISR. The general government finance projection is calculated on the basis of these assumptions and initial data.

The general government surplus/deficit is projected on the basis of individual government revenue and expenditure items. The projections of the variables entering the ISR calculation are an average of two variants. The first variant models government revenues and most government expenditures on the basis of GDP growth in the stress scenario. The projection uses the structure of the individual revenue and expenditure categories according to their share in GDP in line with the CNB's fiscal forecast.[55] The second variant assumes that expenditures will remain at the level foreseen in the CNB fiscal forecast. Expenditures on old-age pensions, health care, unemployment benefits and interest payments enter both variants in the same way. They are modelled on the basis of adverse shocks to GDP, wages, inflation, the unemployment rate and money market rates in the stress scenario.

Old-age pension expenditure is a function of the expected number of future pensioners and the amount of their pensions, calculated assuming the current pension-increase scheme for already awarded pensions and a constant replacement rate for newly awarded pensions. Health care expenditure is based on the cost profiles of individual population groups according to age and gender. Interest payments are based on the debt portfolio structure and reflect expected financial market developments.

The financial markets block simulates a change in market conditions for the issuance of new government debt reflecting the adverse scenario. The yield on new government debt is projected using a statistical model in which the explanatory variables are the main macro-financial and fiscal variables: growth in government debt, the issuer's rating, money market interest rates, expected inflation and the dollar yield curve. The model is estimated by the panel regression method on a sample of data for 35 advanced countries over the last 24 years. The sample of countries includes stabilised countries as well as countries which faced a debt crisis during this period. Sovereign issuer credit risk and the monetary conditions are thus both taken into account. To maintain the dynamics over time, the model assumes that even past yield

TABLE IV.5

Public finance stress test

		Adverse Scenario			Critical limit
	2014	2015	2016	2017	
Macroeconomic variables					
Real GDP growth (%)	2.0	-2.9	-4.1	-2.0	< -2.3
Current account balance (% of GDP)	0.6	2.0	-2.8	-3.4	< -1.8
Gross national savings (% of GDP)*	25.9	25.9	25.9	25.9	< 19.3
External debt (% of GDP)*	56.5	56.5	56.5	56.5	> 99.6
Difference between real GDP growth and real GB yield (pp)	-2.8	4.1	10.8	6.6	> 6.3
Fiscal variables					
Government debt (% of GDP)	42.6	43.5	53.1	63.6	> 64.7
Primary balance (% of GDP)	-0.7	-1.5	-4.3	-6.5	< -3.2
10Y government bond yield (%)	1.6	2.4	2.8	4.0	> 10.8
Government debt maturing within one year (% of GDP)	6.8	7.2	9.1	11.4	> 19.0
Share of government debt maturing within one year (%)*	16.0	16.6	17.1	17.9	> 21.7
Share of foreign currency debt (%)*	14.3	14.3	14.3	14.3	> 27.1
Share of non-residents in debt holdings (%)*	31.7	31.7	31.7	31.7	> 34.9
Institutional variables					
Government effectiveness (WGI score)*	0.9	0.9	0.9	0.9	< 1.0
Political stability (WGI score)*	1.1	1.1	1.1	1.1	< 0.8
Rule of law (WGI score)*	1.0	1.0	1.0	1.0	< 1.2
Banking crisis*	No	No	No	No	> 0
Past sovereign defaults*	No	No	No	No	> 0
Sovereign risk indicator (ISR, %)	**-**	**0.28**	**2.37**	**1.27**	

Source: CNB; for other sources see footnote 52

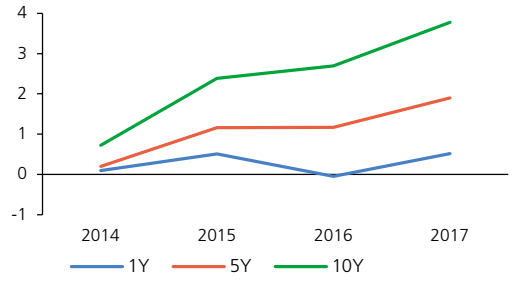
Note: * Variable not modelled, last known value assumed in projection. The figure for the share of non-residents in debt holdings is derived statistically from the balance of payments. According to the quarterly financial accounts methodology, this share is 22%. The symbol > (<) denotes that a higher (lower) variable means the critical limit has been exceeded and increased risk is indicated. Where the limit is exceeded, the relevant variables are indicated in red.

55 CNB (2015): *Inflation Report II/2015*.

CHART IV.27

Czech government bond yields in 2014 and in the stress scenario

(%)



Source: Bloomberg L.P., CNB calculation
Note: The figures for 2014 are the actual market yields to maturity observed on 31 December 2014. The other data are average demanded yields assumed for the given period.

values have forecasting potential, i.e. that market participants' expectations are partly adaptive. The analysis was carried out using government bond yields of three maturities: one year, five years and ten years. The yields for other maturities are derived from these three.

In the current stress test methodology, the maturity structure of newly issued bonds is derived from the maturity structure of government debt in the previous period. This is a simplification, as a sharp increase in the yield curve slope may lead to a decrease in issues with very long maturities. Other variables entering the ISR are regarded as constant over the three-year horizon and their most recent known value is used.

The CNB identified exposures to the domestic sovereign sector as systemically important…

Exposures to the Czech government were identified as systemically important at the end of 2014. This exposure of credit institutions as a whole totalled around CZK 740 billion, or 185% of eligible capital. The share of credit institutions with this systemically important exposure was 85% of their total assets.[56] Therefore, an ISR estimate was made for these exposures using a stress test of Czech public finances. The test is based on the same *Adverse Scenario* as that used in the macro stress tests of financial institutions (see section 3.2).

The stress test indicates a low risk of default of the sovereign exposure under review

According to the public finance stress test (see Table IV.5), the three-year ISR outlook for exposures to the Czech government is 1.27% and thus does not exceed its threshold values over the given horizon. The marked economic decline assumed in the *Adverse Scenario* would be reflected in a rise in the primary deficit to 6.5% and a subsequent increase in total government debt to 63.6% of GDP. Financial markets would respond by increasing the nominal yield demanded on the ten-year government bond. However, given the deflation assumed in the *Adverse Scenario*, this yield would not exceed 4% at the three-year horizon (see Chart IV.27). Moreover, the assumed volume of new issuance is relatively low in view of the current debt maturity structure (the average maturity was 5.3 years at the end of 2014). The impact of growth in interest rates on the total deficit is thus limited. However, the difference between the real yield and the GDP growth rate would be sufficient to reach the critical limit of 6.3%. As real economic growth, the primary deficit and the current account balance would also reach their critical limits, the ISR would stand at 2.37% in 2016. In 2017, however, the ISR would fall to 1.27% owing to an expected increase in economic growth above the critical limit.

The CNB will not apply the additional capital requirement for concentration risk at the three-year horizon

Given the result of the stress test of Czech public finances and the estimated ISR documenting their stability, the CNB will not require

56 Sovereign exposures to other governments, the EU and the EIB were not found to be systemically important.

institutions to meet an additional capital requirement to cover concentration risk for the above-limit part of these exposures at the three-year horizon. The limit for domestic sovereign exposures remains close to 222% of the sector's capital and most exposures are therefore below the limit.

4.6 MACROPRUDENTIAL POLICY AND THE REGULATORY ENVIRONMENT IN THE EU

4.6.1 ACTIVITIES OF THE EUROPEAN SYSTEMIC RISK BOARD

The CNB is forming its macroprudential policy in close connection with the approaches to the identification and mitigation of systemic risks being developed in the EU as a whole. This work is going on mainly within the European Systemic Risk Board (ESRB).

In 2014 the discussions within the ESRB focused mainly on assessing notifications of specific macroprudential measures introduced in this period in various EU countries. The notifications, which were submitted by a whole range of EU Member States, were already governed by CRD IV and pertained to several types of macroprudential tools (form example, risk weights for mortgages and capital buffers based on the country's position in the financial cycle or on structural risks). The CNB provided notification of the introduction of the capital conservation buffer, the countercyclical capital buffer and the systemic risk buffer. The ESRB made no objections to any of the CNB's notifications.

In addition to assessing notifications, the ESRB continued to issue recommendations to central banks, supervisors and other authorities. A recommendation on how Member States should set countercyclical capital buffer rates was issued in 2014. During the preparation of this recommendation, CNB experts successfully promoted the principle that the standard recommended credit-to-GDP ratio is not necessarily the best guide for setting this buffer rate, depending on specific national circumstances. In a review of compliance with the ESRB recommendations issued to date, implementation in the Czech Republic was assessed as being fully compliant.

The ESRB paid great attention to the completion of a report on possible improvements in the regulatory treatment of sovereign exposures (see section 4.5). This is a sensitive topic from both the macroprudential and microprudential regulation and economic policy perspectives. The CNB considers the preparation and publication of this report to be a step in the right direction, even though it regards some of the solutions for the risk mitigation tool relating to sovereign exposures (especially the setting of the limit on bank exposures to sovereigns at the level currently used for other types of exposures) as overly restrictive and unrealistic.

The ESRB was also involved in the preparation of stress scenarios for stress tests of banks and insurance companies in EU countries, conducted during 2014. It also served as a forum where central banks and regulators from individual EU countries could debate various topical

issues (such as persisting low interest rates, risks stemming from excessively large banking sectors, mandatory derivatives clearing through central counterparties, credit activities of investment funds and developments in Ukraine and Russia).

4.6.2 THE BANKING UNION AND THE CAPITAL MARKETS UNION

In addition to the specific instruments listed in section 4.2 and ESRB recommendations, projects focused on deepening financial market integration in the EU and changes to international regulatory standards may have a significant impact on systemic risk and macroprudential policy in the EU.

Single Supervisory Mechanism

The Single Supervisory Mechanism (SSM) was launched last year. Following two years of preparations, the ECB assumed responsibility for supervising the 120 largest euro area banks. During the preparatory phase, regulatory framework documents[57] were approved, a list of significant supervised entities was published and the rules of banking supervision[58] were completed. The main objectives of the framework are to create a level playing field for all SSM members and to reduce the tendency of the financial system to fragment into separate national financial sectors. Joint supervisory teams of the ECB and national supervisors were set up and took over responsibilities in supervisory colleges.

Before the responsibilities were taken over, a comprehensive assessment (CA) was performed. This consisted of an asset quality review (AQR) and an EU-wide stress test of the 130 largest banks, which account for 80% of the assets of the euro area banking sector (EUR 22 trillion). The results, which were published in October 2014, are important for developing cooperation between the ECB and national authorities, which is regarded as a key element of effective supervision in Europe. The detailed AQR covered 800 portfolios and 119,000 debtors. Thanks to a harmonised methodology and to exceptional attention paid to the quality of the AQR, the results allowed for cross-border comparison. A total of EUR 136 billion in new non-performing loans and additional asset impairment of EUR 48 billion were identified. Were the adverse scenario to materialise, the capital shortfall would total EUR 263 billion in 25 of the participating banks at the three-year stress test horizon. Some banks have already topped up their capital, while others have submitted plans to do so. A large part of the information was published, and the high degree of transparency boosted the confidence of investors in the European banking system. The portfolios of some Czech banks were

57 The main document is the *Regulation of the European Central Bank of 16 April 2014 establishing the framework for cooperation within the Single Supervisory Mechanism between the European Central Bank and national competent authorities and with national designated authorities* (SSM Framework Regulation) (ECB/2014/17).

58 ECB (2014): *Guide to Banking Supervision.* http://www.ecb.europa.eu/pub/pdf/other/ssmguidebankingsupervision201409en.pdf

included in the review as part of the portfolios of their parent groups and no significant shortcomings were identified.

The next steps in the development of the SSM involve harmonisation of technical supervisory approaches, which should lead to a reduction in banks' costs and to better cross-border comparability. This approach should also ensure high-quality supervisory standards and unified application of prudential regulation. It should also contribute to the resolution of the long-standing problem of cooperation between home and host supervisors of banking groups operating in the euro area. Memoranda of understanding will be the key instrument for effective cooperation with non-euro area supervisors who do not join by establishing a close cooperation agreement.

The Czech Republic does not expect to join the close cooperation regime in the near future.[59] This is due in large part to the rules of operation of the SSM, which for non-euro area members imply a transfer of powers (in particular, direct supervision of key banks by the ECB and representation in supervisory colleges through the SSM) with no possibility of risk- and cost-sharing at times of crisis. The CNB will therefore retain its current powers over Czech financial market participants and the CNB's position in supervisory colleges will remain unchanged. The CNB is also working actively within the EBA on the preparation and implementation of regulatory tools and actions required under CRD IV and within the ESRB on the design of macroprudential policy.

Capital markets union

The capital markets union (CMU) was proposed as a response to persisting poor access to credit in some euro area countries. In the first quarter of this year, the European Commission launched a public consultation[60] on this project. The building blocks for the CMU institutional set-up are planned to be put in place by 2019. In line with the specified objectives, the CMU should make capital markets more effective, in particular by improving access to the capital markets for small and medium-sized enterprises (SMEs). Another aim is to offer investors and savers new investment opportunities. The CMU involves amending existing legislation rather than creating new institutions. The first specific steps are to include, for example, developing a common accounting standard providing transparent and credible information on individual SMEs so that potential cross-border investors can better choose between them. Other proposed measures include an amendment to the Prospectus Directive stipulating what information should be published by issuers of securities offered to the public. The directive may be revised to make it less onerous for small but highly creditworthy issuers. Other areas

59 For more details, see the *Impact Study of Participation or Non-participation of the Czech Republic in the Banking Union – Summary Report*, prepared by the Ministry of Finance in cooperation with the Ministry of Foreign Affairs, the Office of the Government and the Czech National Bank, and discussed by the Czech government on 9 February 2015.

60 European Commission (2015): *Building a Capital Markets Union – green paper*.

that could be affected by the CMU include tax regulations and insolvency proceedings.

The CNB welcomes the efforts to further the development of the European capital market. Nevertheless, it emphasises that banks traditionally play the dominant role in financial intermediation in European economies. Banks' intermediary role has been hampered by a series of new regulatory duties introduced in recent years. Instead of major structural measures, the CMU project should therefore be limited to minor steps that are easy to implement and have clear benefits, at least until the impacts of this new burden on the banking sector become clear. In the CNB's opinion, any new legislative proposals must not reduce investor protection or lower the requirements for prudent behaviour by financial market participants.

4.6.3 THE RECOVERY AND RESOLUTION FRAMEWORK

Significant progress has been made in the area of the Single Resolution Mechanism (SRM). Directive 2014/59/EU of the European Parliament and of the Council establishing a framework for the recovery and resolution of credit institutions and investment firms (the Bank Recovery and Resolution Directive, BRRD) took effect in July 2014. It will be supplemented with several dozen implementing regulations and guidelines issued by the European Commission and the EBA. The primary objective of this legislation is to increase the resilience of the credit institutions sector and to put in place mechanisms to minimise the negative impacts of the failure of an institution[61] on the financial stability of its home Member State and on the EU as a whole. The BRRD therefore contains both preventive powers and procedures for mitigation of the risk of bank failure, and powers and procedures for the preparation and implementation of crisis resolution. These procedures are very complex and the BRRD requires constant performance of many new activities even at times when no institution is failing.

Owing to the very short deadline for transposing the BRRD into national law, many EU Member States – including the Czech Republic – have yet to complete this process. The BRRD is to be transposed in the Czech Republic by a Recovery and Resolution Act and a related amending act. The BRRD requires each EU Member State to establish a resolution authority. According to the draft transposition act, the CNB will be the resolution authority in the Czech Republic. In accordance with the BRRD, it must be ensured that the resolution function is highly independent of the other functions of the relevant authority. To this end, a Resolution Department has been established at the CNB under the direct supervision

61 The BRRD applies to a broad group of entities, most notably banks, credit unions and some investment firms (hereinafter "institutions"). In addition, some of the powers envisaged in the BRRD may be applied to other members of the same financial groups. Given the structure of the Czech financial market, banks are by far the largest set of institutions as far as financial stability is concerned, so in some parts of this text we sometimes simplify and refer to banks only.

of the Bank Board. It will specialise in resolution-related duties and is independent of other units.

In the recovery area, the BRRD introduces a duty to compile recovery plans and grants resolution authorities early intervention powers. In the resolution area, it introduces a duty to prepare resolution plans to establish a resolution fund financed by contributions made by institutions. It also entrusts the resolution authorities with a number of powers. The resolution authority has bail-in tools (see Box 7), such as the sale of the business or part thereof, the use of a bridge institution or asset management vehicle, and the write-down or conversion of capital and eligible liabilities. Cooperation between the CNB and the Ministry of Finance or the government will be necessary in some cases. Any bail-out would be subject to approval by the European Commission under Article 107 of the Treaty on the Functioning of the EU. In any event, the application of resolution tools is conditional on meeting the public interest criterion.

From a practical perspective, the following duties will be of particular importance to the CNB after the transposition act has been adopted: assessing recovery plans prepared by institutions, preparing resolution plans, calculating contributions to the resolution fund and specifying the extent to which institutions will have to maintain capital and certain types of eligible liabilities that can be used to recapitalise banks (the MREL, see Box 7). Given the expected delay in transposition and the gradual preparation of implementing regulations by the European Commission and the EBA, some methodological and operational complications may arise at first. This applies in particular to the payment of the first contribution to the resolution fund and to the setting of the MREL.

The CNB is working with the EBA, the Ministry of Finance and the Deposit Insurance Fund on establishing resolution mechanisms and structures. At international level, the CNB is gearing up for participation in resolution colleges. As the systemically important banks operating in the Czech Republic are members of international banking groups, the Single Resolution Board will be the CNB's most important partner in these colleges. One source of inspiration at the moment is Austria, mainly because of its practical experience with the resolution of Hypo Alpe Austria and its successor "bad bank" HETA. Inspiration can also be drawn from the experience of the resolution of Portuguese and British banks. However, only potential future cross-border experience of resolution in the banking sector will show whether the single framework is sufficiently robust on the European scale.

BOX 7: THE BAIL-IN TOOL AND THE MINIMUM REQUIREMENT FOR OWN FUNDS AND ELIGIBLE LIABILITIES OF BANKS (MREL)

Preparations for the introduction of the tool for writing down or converting capital instruments and eligible liabilities (hereinafter "bail-in") into the regulatory framework at global and European

level continued last year. The BRRD introduces this tool in EU Member States. Bail-in is one of the resolution tools. It consists of a set of rules under which the owners and some unsecured creditors of an institution (e.g. holders of its bonds) will help maintain some or all of its operations in a crisis situation by writing down their capital holdings in the institution or writing down the institution's eligible liabilities to them (resulting in coverage of the institution's loss) or by converting those liabilities into capital instruments (resulting in recapitalisation of the institution or capitalisation of a bridge institution, to which the institution's business or part thereof will be transferred). Successful use of the bail-in tool is conditional on the presence of a sufficient volume of capital and debt instruments in the institution's balance sheet capable of absorbing losses.[62]

To ensure sufficient loss-absorbing capacity, supervisory and resolution authorities will set minimum requirements for the structure and amount of the capital and eligible liabilities of individual banks.[63] For this purpose, the Financial Stability Board established by the G20 is currently working on international standards for global systemically important banks using the concept of total loss-absorbing capacity (TLAC). A similar concept has already been introduced at the EU level in the BRRD, taking the form of a minimum requirement for own funds and eligible liabilities (MREL). The EBA published draft regulatory technical standards (RTS)[64] for the MREL in November 2014 and conducted a public consultation in late 2014 and early 2015. The EBA is expected to submit the final draft of the RTS to the European Commission for approval by July 2015.

The success of any new conceptual tool hinges on how it is implemented and configured. The way in which the level and structure of the MREL are set will be crucial as regards the application of the bail-in tool in the EU. In contrast to capital ratios and the leverage ratio, the BRRD does not specify a single minimum MREL level for all institutions in the form of a ratio of capital and eligible liabilities to risk-weighted assets/total assets. The minimum requirement will be specific to each institution and the resolution authority will have to prescribe it in the form of a

62 In addition to capital instruments, the institution's liabilities will be subject to write-down or conversion unless they fall under the exemptions defined in the BRRD. Secured liabilities, covered deposits, short-term liabilities to systems with settlement finality and some other types of liabilities are exempt.

63 The BRRD imposes additional requirements on eligible liabilities compared to liabilities to which the bail-in tool can be applied (for example, it requires eligible liabilities to have a remaining maturity of at least one year). Eligible liabilities are therefore a subset of the liabilities to which the bail-in tool can be applied.

64 Draft Regulatory Technical Standards (RTS) further specifying the criteria to set the minimum requirement for own funds and eligible liabilities (MREL). Published by the EBA on 28 November 2014.
See http://www.eba.europa.eu/documents/10180/911034/EBA+CP+2014+41+%28CP+on+draft+RTS+on+MREL%29.pdf.

ratio of eligible liabilities plus capital to total liabilities plus capital. In simple terms, under the draft RTS the MREL will have two components: a loss absorption amount (LAA) and a recapitalisation amount (RCA). According to the draft RTS, the LAA should be at least equal to the total capital requirements applicable to the institution. In addition to the 8% minimum under Pillar 1, it should comprise the Pillar 2 requirements and all capital buffers (the capital conservation buffer, the countercyclical capital buffer, the systemic risk buffer and the buffer for other systemically important institutions).

The minimum RCA depends on the nature of the institution and the corresponding resolution method.[65] Where the resolution plan assumes that the institution will be wound up in standard liquidation or insolvency proceedings in the event of failure (bank A in Table IV.2 Box and Chart IV.2 Box), the RCA can be set at zero. In such case, the institution's MREL would consist solely of the LAA, which means it would equal the total capital requirement. According to the draft RTS, the process of determining the MREL will be more difficult for institutions where full liquidation is not appropriate and ensuring continuity of critical functions – either in the original legal entity or through the transfer of such activities to a bridge institution – is preferable (bank B in Table IV.2 Box and Chart IV.2 Box). In this case, the RCA should equal the capital requirements depending on the assumed[66] size of the transfer of part of the institution's balance sheet. For institutions where the resolution plan assumes full recapitalisation using the bail-in tool (bank C in Table IV.2 Box and Chart IV.2 Box), the RCA should be at least equal to the institution's overall capital requirement.[67] For systemically important banks, this implies an MREL of at least double the total capital requirement.

The draft RTS for the MREL contained some problematic issues from the point of view of the Czech banking sector. These related primarily to the determination of the MREL for systemically important institutions. In their case, the total MREL requirement could be as much as double the institution's total capital requirement (the Pillar 2 requirements and any capital buffers on

TABLE IV.2 BOX

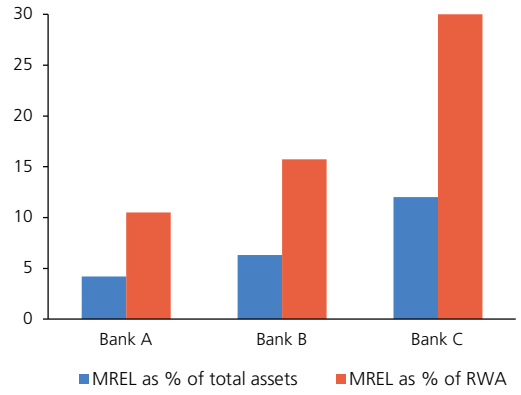
Illustration of the calculation of MREL components for hypothetical banks

	Bank A	Bank B	Bank C
Total assets	100	100	100
RWA	40	40	40
Total capital requirement (% of RWA)	10.5	10.5	15
Capital	4.2	4.2	6
Eligible liabilities	0	2.1	6
Proportion of assets transferred	0	50	100
LAA (% of RWA)	10.5	10.5	15
RCA (% of RWA)	0	5.25	15

Source: CNB calculation
Note: It is assumed that bank A and bank B will only be required to maintain a capital conservation buffer of 2.5% on top of the 8% minimum (i.e. no Pillar 2 or buffer requirements), while bank C will additionally be required to maintain a Pillar 2 requirement of 1.5% and a systemic risk buffer of 3%.

CHART IV.2 BOX

Results of the MREL calculation for hypothetical banks
(% of total assets or RWA)



Source: CNB calculation

65 Even in the model examples below, resolution authorities will enjoy a considerable degree of flexibility and the choice of specific measures and procedures will depend on a number of factors. The solutions may therefore differ widely from case to case. The examples here give only an approximate illustration of how the MREL concept works.
66 The MREL will be set *ex ante* on the basis of assumptions. Of course, the amount of funds actually needed for a bail-in can be determined during the resolution process on the basis of a valuation.
67 This is a simplified assertion based mainly on the assumption that the institution goes through resolution without a change in its size (no activities terminated, no assets sold, etc.) and that the risk weights of the institution's exposures remain unchanged.

top of the Pillar 1 minimum of 8%). In some institutions, the MREL could therefore exceed 30% of risk-weighted assets (bank C in Chart IV.2 Box).[68]

To meet such a high requirement, banks would need to have very high capital ratios or many eligible instruments held by unsecured investors. This can be assumed for large and complex banks with cross-border activities and high levels of financial market funding, for which the TLAC concept was originally created. However, the requirement is economically problematic for conservative and locally oriented retail banks which finance their activities fully or mostly by insured deposits. As insured deposits are not included in the MREL, these banks would have to meet the MREL requirement using capital, seek investors for eligible liabilities or radically change the risk structure of their balance sheets. Meeting the MREL with capital alone would be a costly form of financing for banks and would put them at a disadvantage compared to banks funded by bonds, for example. Replacing a large proportion of deposits with eligible liabilities could be very difficult and counterproductive from the business model perspective. If a group of banks having a large market share were forced to take such a step, prices of eligible instruments would probably fall. Potentially insufficient demand for unsecured bank bonds among private investors also poses a risk. Coupled with efforts to markedly reduce the balance-sheet risk profile in the event of insufficient interest in eligible liabilities, this could lead to lower availability of credit to the private sector and a weakening of economic activity.

The assumption contained in the draft RTS that both components of the MREL requirement, i.e. the LAA and the RCA, should be ensured at the level of the total capital requirement including all buffers is too ambitious from the retail bank perspective. The Pillar 1 and Pillar 2 capital requirements are basically meant to ensure that the institution remains solvent even in the event of unexpected losses. The combined buffer requirement is intended to reduce the probability of the institution's capital falling below the Pillar 1 and Pillar 2 levels. If that happens nonetheless, i.e. if the combined capital buffer is partly or fully exhausted, it is enough merely to restore it gradually based on a realistic recapitalisation plan. By contrast, the BRRD requires the MREL to be maintained constantly, with no option of gradually restoring the buffer using retained profits. The MREL determination mechanism in the draft RTS would therefore be much stricter and less flexible. It would take less account of the total risk of institutions and go far beyond the current capital regulation framework. Moreover, if the MREL were to include a non-zero

68 An additional rule that the MREL should not be lower than 8% of total assets should also apply to systemically important institutions.

countercyclical buffer and the total requirement were primarily equal to CET1 capital, banks might not be capable of lowering the countercyclical buffer rate to zero in practice. Overall, this would reduce the effectiveness and flexibility of macroprudential policy.

In general, the CNB agrees that banks' loss absorption capacity and their ability to recapitalise as much as possible from private funds, i.e. without using taxpayers' money, fosters long-term banking sector stability and thereby contributes to public finance sustainability. After all, it was well-capitalised banks that coped with adverse shocks better and faster during the financial crisis. However, the CNB regards the method for determining the MREL contained in the draft RTS as best suited to large and complex globally active banks. It therefore submitted two sets of requests in the EBA consultation. First, resolution authorities should be allowed to consider the characteristics of a bank's business model, mode of financing and risk profile when setting its MREL. Second, resolution authorities should be allowed to judge which components of the total capital requirements or the combined capital buffer are sufficient to ensure that the institution has the capacity to absorb losses and recapitalise. Similar requests were made by other contributors to the public consultation and the final draft of the RTS can be expected to reflect them at least in part.

It is important to bear in mind that the bail-in tool does not guarantee that from now on any problems in the banking sector will be dealt with by the shareholders and creditors of distressed banks with no need for state-funded bail-outs. Both approaches to bank resolution have their advantages and disadvantages.[69] Bail-in promotes prudential behaviour by banks, investors and creditors, but the costs associated with maintaining the MREL arise in advance and exist continuously even in the absence of crises. In the case of a bail-out, no costs arise until the bail-out is performed. Moreover, if it is handled well, it can eventually yield profit to taxpayers. Bail-in may not be painless to the economy, and may not even be available in a systemic crisis. Resolving a systemic crisis by imposing losses on shareholders and creditors could have large or even dramatic impacts on the financial and real sectors. The authors of the BRRD were aware that in a systemic crisis the government may have to intervene to restore confidence in the stability and functioning of the sector. In this regard, it is vital to perform banking supervision and apply

69 Mayes, D.: (2014): *Bank Structure and Resolution. Journal of International Banking and Financial Law*, December 2014, p. 4; Mayes, D.: (2014): *The Funding of Bank Resolution in Europe: Will the New Framework Meet Expectations*? Presentation for Bruegel, 16 December 2014.

macroprudential policy consistently to reduce the frequency and intensity of crises.

Financial Market Guarantee System

The draft Recovery and Resolution Act[70] establishes and regulates the Financial Market Guarantee System, which will manage the funds of the Deposit Insurance Fund (DIF) and the Resolution Fund (RF). The assets of the funds will be kept separate from the assets of the Guarantee System, which will operate as a management company.

Changes in the functioning of the DIF are governed by a draft law implementing the deposit-guarantee schemes directive.[71] The main objective of the directive is to unify the level of depositor protection in the EU.[72] The draft law introduces a target DIF level of 0.8% of covered deposit claims. Another significant change is the possibility for the DIF to take into account the institution's risk profile and the phase of the business cycle when setting the annual contribution. Other changes in the draft law include a shorter deadline for deposit compensation, exemption of certain deposits from the basic deposit insurance limit and the possibility of lending between the deposit insurance systems of individual Member States.

The aim of the establishment of the RF is to protect and stabilise the financial market. Banks, credit unions, investment firms and branches of these institutions established in other Member States (hereinafter the "contributing institutions") will contribute to the RF. The RF's funds may be used for resolution purposes if specified rules are observed. As for the RF that is to be established in the Czech Republic under the directive, its target level must be at least 1% of covered deposits with credit institutions in the Czech Republic as of the end of 2024. From 2015 onwards, the contributing institutions should pay more than CZK 2 billion a year into the fund. The target amount is estimated at about CZK 25 billion. Given the total bank assets of around CZK 5,300 billion (as of the end of 2014), the RF would represent roughly 0.5% of total assets.

Credit institutions established in an SSM country and banks from non-EU countries having a branch in an SSM country will gradually pay contributions through their national funds to the Single Resolution Fund (SRF) so that 1% of covered deposits with credit institutions in SSM

70 The draft Act transposes Directive 2014/59/EU of the European Parliament and of the Council establishing a framework for the recovery and resolution of credit institutions and investment firms.

71 Directive 2014/49/EC of the European Parliament and of the Council of 16 April 2014 on deposit-guarantee schemes. The directive is expected to be implemented into Czech law in the second half of 2015.

72 The compensation provided to holders of deposits has been harmonised at the European level (at EUR 100,000), but the target levels of national deposit insurance funds have not.

countries, i.e. around EUR 55 billion,[73] is reached by approximately 2024.[74] Funds will be increasingly shared between the SRF national sub-funds, which will cease to exist after a transition period. All the funds in the SRF will then be available for resolution in any SSM country. However, the target level of EUR 55 billion is quite low (0.2%) in relation to banks' total assets (around EUR 30,000 billion). In the euro area, the European Stability Mechanism (ESM) could also be used for direct recapitalisation of banks, but the funds available there are also low (at roughly the same level as in the SRF). As with the resolution framework, the robustness of these national and European sources of financing will not be tested until the next financial crisis occurs.

73 EUR 55 billion is the European Commission estimate given in the presentation of the relevant legal act (http://europa.eu/rapid/press-release_MEMO-14-597_en.htm). The actual amount will be derived from the amount of covered deposits in SSM countries. The SSM membership may also develop in different ways, and this would affect the target amount of the SRF in absolute terms.

74 Under certain conditions, European regulations allow the deadline for attaining the target level to be extended.

PART II – THEMATIC ARTICLES

THE INTERACTION OF MONETARY AND MACROPRUDENTIAL POLICIES IN THE PURSUIT OF THE CENTRAL BANK'S PRIMARY OBJECTIVES

Jan Frait, Simona Malovaná, Vladimír Tomšík

This article is concerned with the interaction of monetary and macroprudential policies at different stages of the financial and business cycle. We focus on identifying related channels of transmission of the two policies and potential feedback between them. Our methodology allows us to obtain information from large number of variables and thus provides a comprehensive picture of the potential impacts of a monetary easing and a macroprudential tightening. The analysis reveals that in some situations monetary policy and macroprudential policy can come into conflict in the pursuit of their objectives. It is therefore crucial to coordinate them and seek an optimal policy mix based on a detailed assessment of the economic outlook.

1. INTRODUCTION

Monetary policy based on inflation targeting has proved to be very effective in combating inflation since it was first introduced in the 1990s. Following the economic and financial crisis of 2008–2013, however, many monetary economists and central bankers have started to ask whether the main postulates of this form of monetary policy should be revised and supplemented. Research in the fields of monetary economics and financial stability has started to concentrate much more on (re-)testing theories that try to explain the formation of economic and financial crises in terms of changes in the dynamics of monetary and credit variables, most notably bank loans (Aikman et al., 2014).[1]

In the textbook monetarist monetary policy framework, lending is predicated on the existence of deposits. Banks face a relative shortage of bank liquidity and can obtain additional liquidity from the central bank, usually in open market operations. In this framework, the central bank's ability to restrict banks' access to liquidity implies control of the amount of loans. Since loans are the main source of money, liquidity management should deliver control of inflation in the long run. However, the modern world differs greatly from the era when this framework came into being. Changes in the functioning of financial systems have eroded central banks' ability to control credit growth by managing liquidity (McLeay et al., 2014). Lending itself has started to deliver the necessary deposits. Quantitative easing and extensive purchases of foreign assets by central banks have created a large set of countries whose banking systems operate in conditions of "excess" liquidity. This access to central bank liquidity tools means that banks no longer face significant lending constraints. Such constraints are now meant to be created by macroprudential policy in addition to capital and liquidity regulation.

The incorporation of macroprudential policy into the framework for the functioning of central banks reflects a worldwide shift in the understanding of the duties of central banks. As an integrated monetary and supervisory authority since 2013, the CNB is formally responsible for implementing the objectives of both financial stability and price stability. To this end, it employs macroprudential policy tools, microprudential supervisory tools and, where necessary, regulation. As monetary policy and macroprudential policy both affect the functioning of the entire financial sector and thus of the economy as a whole, when configuring these policies the CNB has to take into account how they interact and make sure they are coordinated. The right policy mix depends on the intersection of two different cycles – the business cycle and the financial cycle.

This article is concerned with the coordination of monetary and macroprudential policies from the perspective of their real effects and their interaction at different stages of the financial and business cycle. It first defines the relationship between the two policies, focusing on identifying related transmission channels and similarities in transmission mechanisms. It then discusses the need to coordinate the two policies given the risks associated with credit growth and demand-side developments. This discussion is supported with a simulation of the effects of a monetary policy easing, a macroprudential tightening and an increase in house prices using data from the Czech economy.

1 Economic theory offers several explanations of why credit growth can exceed GDP growth at certain stages of the business cycle. A survey of these explanations is given, for example, in Mandel and Tomšík (2015).

2. THE RELATIONSHIP BETWEEN MONETARY POLICY AND FINANCIAL STABILITY POLICIES

In the early 2000s, academic economists and central bankers generally agreed that monetary policy tools should be deployed to deliver price stability while microprudential regulation and supervision should be used to achieve financial stability (Bernanke, 2002). It was also thought that the central bank should respond to financial market and asset market developments only insofar as they affected inflation. In response to the financial crisis, a consensus emerged that macroprudential policy tools needed to be added to the traditional approaches of microprudential regulation and supervision. It was also accepted that price stability alone was not enough for maintaining financial stability. In this context, there was renewed discussion about whether the central bank should take the risks to financial stability into account in its monetary policy tools even when the current forecast does not indicate any risks to price stability over the monetary policy horizon (Frait et al., 2011; Woodford, 2012). A full consensus on this issue has not been reached so far. However, this article does not seek to answer this question and focuses instead on macroprudential and monetary policy coordination.

The need for such coordination is based on the observation that monetary and macroprudential policy tools are not independent, as they affect both the monetary and credit conditions via their effect on credit growth.[2] In some situations the two can come into conflict because of a need for them to work in opposite directions, while in other situations it may be desirable for them to act in the same direction. This makes it necessary to analyse their interactions at different stages of the financial and business cycle and to coordinate them where appropriate (Borio, 2014; IMF, 2013).

Monetary and macroprudential policy coordination is superfluous in pre-crisis general equilibrium models, as such models contain no financial frictions, asymmetric information and non-linearities. In such a framework, it is optimal for the monetary authority only to react to macroeconomic developments by changing the monetary conditions. In reality, though, macroprudential policy tools cannot eliminate all the frictions, shocks and imbalances that exist in financial markets. In this situation, the financial conditions are also important for monetary policy-makers (Woodford, 2012; Adrian and Liang, 2014).

Financial market conditions have been partially incorporated into general equilibrium models in response to the financial crisis. In these models, it is the job of monetary policy to control the risk-free interest rate and that of macroprudential policy to control the credit risk premium (Baillu et al., 2012). However, these models remain highly stylised and necessarily abstract from many important economic linkages and transition mechanisms. Consequently, they cannot fully capture the interactions between monetary and financial conditions and the simultaneous effects of monetary policy on financial stability and of macroprudential policy on macroeconomic developments. In addition, the short period of use of macroprudential tools in advanced countries means there is limited empirical evidence on their effectiveness and side-effects.

The models central banks currently use to analyse macroeconomic developments, formulate monetary policy recommendations and simulate changes in monetary conditions work primarily with the interest rate and exchange rate channels of the transition mechanism (Tovar, 2008; Franta et al., 2014). However, anything that affects the availability and price of credit also affects credit growth and thus also monetary policy transmission. Changes to monetary policy tools hence also act via the credit demand and supply channels, the asset price channel and the risk-taking channel (for details, see Égert and MacDonald, 2009).

The *bank lending channel* acts via the bank credit supply. It is based on a mechanism whereby the monetary authority influences the cost of financing and banks' access to funding sources. As the monetary policy rate decreases, so do banks costs' of raising funds on the money market. As a result, banks can lend more – and more cheaply – to households and firms. Households and firms that might have been rated as too risky before the monetary policy easing now have access to credit. The *bank capital channel* has a similar effect – easier monetary policy increases banks' profitability, leading to higher capitalisation and a greater ability to lend.

The *balance sheet channel* acts through asset prices and affects the ability of households and firms to obtain credit. A decrease in interest rates leads to an increase in the prices of assets that can be used as collateral when applying for a loan (Bernanke and Gertler, 1989). This reduces the mark-

2 Macroprudential policy affects the capital market conditions as well as the credit conditions, i.e. the overall financial conditions. However, given the banking sector's dominant role in the Czech financial sector, this article focuses for simplicity on the credit conditions.

up that borrowers have to pay for external financing. The resulting increased demand for credit gives rise to an acceleration in credit growth and subsequently also in consumer and investment demand.[3]

Through the *asset price channel*, lower monetary policy rates lead to a rise in asset prices, thereby increasing the perceived wealth of households. This, in turn, is reflected in higher household consumption. In the case of firms, equity prices go up, implying a reduced cost of corporate capital for investment financing (the "Tobin's q" effect).

In recent years, economists have been devoting considerable attention to the *risk-taking channel*, which focuses on the behaviour of financial institutions. In the short run, a monetary policy easing enhances the stability of banks, as low interest rates improve the overall quality of their loan portfolios.[4] In the long run, however, low rates can give banks a greater incentive to expand their balance sheets and invest in more risky assets in an effort to attain their original target rates of return equal to their original interest margins (Diamond and Rajan, 2012). This occurs through higher lending coupled with softer lending conditions (Borio and Zhu, 2008). In the long run, cutting policy rates to very low levels affects loan quality as well as quantity (Maddaloni and Peydró, 2013).[5] Banks' liability-side risks also increase. The proportion of market-based funding with compressed risk premia goes up, as does the amount of maturity transformation (Adrian and Shin, 2010; Adrian and Liang, 2014).

The complexity of the transition mechanism means that changes in the key monetary policy tool, the short-term interest rate, can act simultaneously via various channels differing in strength according to the current position of the economy in the financial and business cycle, the structural characteristics of the financial system and other characteristics of the economy. Changes in credit conditions can also affect certain transmission mechanisms. By contrast, a change in the cyclical component of the macroprudential conditions affects not only the lending conditions, but also the monetary conditions via the lending and asset price channels. A tightening of a macroprudential tool will affect the price and availability of credit. This can impact on the balance sheets of households and firms and subsequently on demand in the economy.

Under certain conditions, conflicts can arise between monetary policy pursuing an inflation target on the one hand and credit stability on the other. Let's look at some examples. First, low and stable inflation and resulting low nominal interest rates can paradoxically lead to a situation where banks and their clients start perceiving risks as being low on average. A relaxation of lending standards and a reduction in risk premia lead, ceteris paribus, to a rise in the prices of financial and real assets used as collateral. These processes produce an acceleration in credit growth, which can potentially result in overleveraging of the economy when the perceived low risk turns out to be just an illusion. So, under certain conditions, price stability can foster financial instability.[6]

Second, an interest rate cut in response to disinflationary pressures can fuel asset price bubbles. The economy may be exposed to a positive supply shock due, for example, to technological progress or lower global commodity prices. Alternatively, an economic recovery may prompt foreign investors to significantly and positively revise their view of the outlook for the domestic economy, causing its currency to appreciate. The inflation forecast will fall below the inflation target and the inflation-targeting central bank will respond by cutting policy rates. A potential side-effect of the combination of optimistic growth forecasts, a strong currency and falling interest rates is growth in prices of financial and real assets and the subsequent emergence of self-fulfilling expectations, which can give rise to speculative bubbles.

Third, in a small open economy with high cross-border capital mobility, misplaced expectations about the stability of the domestic currency can be a source of conflict between inflation targeting and financial market stability. Imagine a situation where the central bank raises its policy rates in an attempt to stop inflation rising above the target in the future. With interest rates on domestic currency loans rising, borrowers may redirect part of their demand to "cheaper" foreign loans. If, however, the foreign currency strengthens

3 This phenomenon has long been known and is referred to in the literature as the financial accelerator.

4 Easing monetary policy by cutting short-term interest rates also supports the profitability of banks. Banks' funds tend to have shorter maturities than their assets. A reduction in rates therefore leads to a rapid decrease in funding costs relative to asset yields.

5 The financial crisis also confirmed the assumption that the sustainability of such changed balance sheets is conditional on interest rates being low. If a crisis occurs, rates will have to be kept low or cut even further to maintain banks' ability to lend to the private sector.

6 For example, a monetary policy easing will reduce interest rates on house purchase loans. This will support construction and investment in housing. Growth in house prices can further boost consumer demand via the wealth effect. However, if households gradually take on too much debt and overestimate their ability to service their loans after interest rates go up, they and their banks will become vulnerable.

significantly, unhedged borrowers will see their debt service costs increase and many of them may default. The Hungarian economy has been hard hit by the materialisation of this risk in recent years. Likewise, the sharp appreciation of the Swiss franc in early 2015 has hurt borrowers in Croatia, Poland and Austria.

3. MONETARY POLICY AND MACROPRUDENTIAL POLICY: RIVALS OR TEAMMATES?

A fierce debate on the interaction of monetary and macroprudential policies erupted in 2013 in connection with the accommodative monetary policy being pursued by the Federal Reserve, the ECB and the Bank of England coupled with a strong recovery in property markets and some financial market segments. Many commentaries were published on the contribution of the sustained easy monetary conditions to inflated prices of houses and some other assets, the greatly increased activity on the corporate bond market, inadequate risk assessment and the compression of yields on debt securities (BIS, p. 3; IMF, pp. 6–8; ECB, p. 37). The prevailing conclusion of this debate is that the potential undesirable effects of easy monetary policy on the risks to financial stability can be largely mitigated by applying suitable macroprudential tools in good time. However, concerns have been voiced that more aggressive use of such tools could neutralise the effects of accommodative monetary policy and foster deflationary pressures. This risk is also indicated by the simulation of the effects of an increase in the capital adequacy ratio contained in the next section.

The existence of a potential conflict between monetary and macroprudential policies, the strength of that conflict, and the optimum policy mix for minimising it, all depend on which phase of the financial and business cycle the economy is in (Borio, 2014) and on what sorts of shocks the economy is currently exposed to. These factors determine the strength of the relative risks associated with credit growth on the one hand and demand-side developments on the other. Table 1 describes suitable combinations of responses of the two policies. At first glance, these combinations may seem logical and uncontroversial. Sometimes that is indeed the case, but at other times it can be very hard to decide on the right mix in reality. If the economy is starting to climb out of recession and emerge from a banking crisis, easing both policies works in a single, common direction, since inflation pressures and risk-taking are both at a low level. The easy monetary policy does not compress risk premia and does not encourage excessive risk-taking. If the economy is in a phase where credit growth is accelerating and financial imbalances are starting to form, maintaining easy monetary policy may initially help further improve the current financial risk indicators (primarily by reducing the default rate), but may simultaneously generate latent risks that could later manifest as a sharp deterioration in loan portfolio quality (see Frait and Komárková, 2012, p. 17). Both policies should be kept neutral, or one of them – macroprudential policy – should be tightened.

The policy combinations in Table 1 should be regarded as dominant, but not always optimal and attainable. Other combinations may be desirable or necessary in some circumstances. At times of weak demand and falling leverage, a macroprudential policy easing will tend to bolster the transmission of easy monetary policy, help eliminate overly pessimistic expectations and stabilise the financial sector, and foster economic recovery. However, this effect is

TABLE 1

INTERACTION OF POLICIES AT DIFFERENT STAGES OF THE FINANCIAL AND BUSINESS CYCLE

		Inflationary pressures		Disinflationary pressures	
		Strong demand	Weak demand	Strong demand	Weak demand
Rapid credit growth and rising asset prices	Monetary pol.	Tightening > IT	Tightening	Easing< IT	Easing
	Macroprud. pol.	Tightening	Tightening	Tightening	Tightening
Decline in credit and falling asset prices	Monetary pol.	Tightening	Tightening < IT	Easing	Easing> IT
	Macroprud. pol.	Easing	Easing	Easing	Easing

Source: CNB
Note: Some combinations are unlikely. The symbols > IT and < IT denote monetary policy responses that are, respectively, stronger and weaker than those needed to attain the inflation target. Green boxes = policies complement each other. Red boxes = policies potentially conflict. Combinations where inflation is close to the target, loans are growing at a reasonable rate and asset prices are at normal levels are not shown in the table, as in these cases the responses of the two policies will be moderate and will not interact significantly.

contingent on the financial sector being in relatively robust health at the time. If the sector is very weak, a macroprudential policy easing could undermine confidence in its stability and will not be accommodative in its effect.[7] In such case, failure to fulfil the macroprudential policy objective reduces the extent to which monetary policy can attain its objectives. The right response may thus be to tighten macroprudential policy by taking action to enhance the capital adequacy of banks, as this will safeguard the functioning of the monetary policy transmission mechanism.

From the conceptual perspective, there is no doubt about the need to coordinate the two policies in such a situation (Shakir and Tong, 2014). From the practical point of view, however, it will be very difficult for the monetary authority to decide, especially if the two policies are conducted by different authorities. This is due to different probabilities of failure to fulfil the two main objectives (Adrian and Liang, 2014). It is highly likely that the macroeconomic forecast will imply failure to hit inflation target in the short run, whereas at any given moment in time systemic risk will have the potential to materialise in the medium run only. The monetary authority's natural response will thus be to prioritise the inflation target. Preference is unlikely to be given to the financial stability objective, as this would require a consensus that the risk of a future financial crisis has exceeded a critical level. No such consensus was reached before the recent financial crisis. On the contrary, the rising systemic risks were downplayed. It is the difference between expected risks and merely potential vulnerabilities that makes the two types of policy often very difficult to coordinate in practice.

A specific problem arises when the recovery is more sustained and output is near its potential but the inflation pressures are very weak and interest rates therefore stay very low. If this situation persists, credit growth is likely to recover and demand for risky assets will increase, leading to growth in their prices. The USA and some other advanced countries started to get into a similar situation in 2013–2014. From the conceptual perspective, the right response is to partially tighten macroprudential policy, as there is an increasing risk of households and firms becoming overleveraged and the financial sector becoming more vulnerable. If this step is ineffective, the monetary policy authority may be faced with the dilemma of whether to support the achievement of the financial stability objective by preventively tightening the monetary conditions at the cost of missing the inflation target in the short run. Should central banks under certain conditions really abandon their inflation target and switch to some mode of financial or credit stability "targeting"?

As mentioned in section 2, there is no consensus among economists on whether the central bank should "lean against the wind", i.e. whether it should take the risks to financial stability into account in its monetary policy tools even when the current forecast does not indicate any risks to price stability. Many will probably agree that leaning against the wind is the right response in principle but will have doubts about whether a slight increase in monetary policy rates is an effective tool for curbing a credit boom. Some would argue that monetary policy, unlike individual macroprudential tools, can at least partially address the wide range of processes and linkages generating a credit boom. Central banks' monetary policy independence enables them to deploy monetary tools quickly, whereas the application of macroprudential tools may require them to negotiate with other authorities, overcome political resistance or change the law. Leaning against the wind as a safeguard against growth in the vulnerability of the system is supported by the existence of the "bank" channels of monetary policy transmission, especially the risk-taking channel. Woodford (2012) states that taking financial stability into account when setting monetary policy rates is merely a natural extension of flexible inflation targeting. Conflicts can arise between the price stability and financial stability objectives, but they also arise between the price stability and economic stability objectives, which are covered by flexible inflation targeting in its conventional sense.

Despite all this debate, there is a consensus that the use of macroprudential policy tools is the primary and preferred way of preventing increased financial sector vulnerability. Monetary policy tools should be used only rarely for this purpose, primarily during credit booms accompanied by soaring asset prices. In this situation, the central bank can convincingly communicate the need to set interest rates at a higher level than that fully consistent with hitting the inflation target at the monetary policy horizon. Such communication can enhance the effectiveness of macroprudential policy.

7 A similar situation occurred around 2011, when firms' access to credit worsened in some countries as a result of the systemic crisis in the euro area. To improve the situation, it was first necessary to restore confidence in the stability of banks by increasing their capital adequacy ratios.

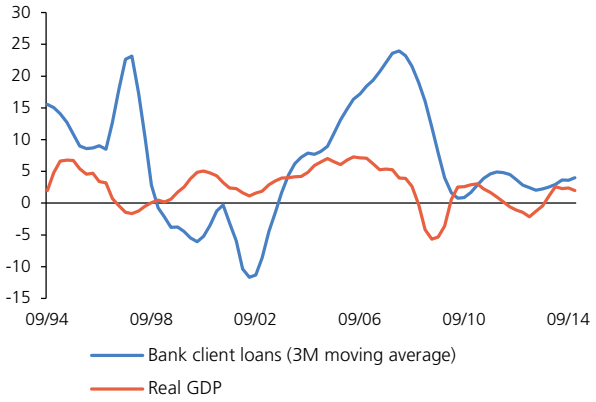
4. THE IMPACT OF MONETARY AND MACROPRUDENTIAL MEASURES IN THE CZECH ECONOMY

One of the key conclusions of post-crisis studies of the financial cycle is that sharp growth in the ratio of credit to GDP is strongly correlated with subsequent banking crises (Aikman and Liang, 2014; Borio, 2012; Schularick and Taylor, 2012). This conclusion cannot be applied mechanically in the assessment of systemic risk. In relation to the size of the domestic economy the Czech financial sector is small by international standards and its growth over the last decade has been linked largely with economic transformation and convergence. The limited significance of its capital markets also makes it less able to generate rapid growth in private sector debt. However, this does not mean the Czech economy is immune to credit booms sowing the seeds of future financial crises. In the Czech Republic, as elsewhere, bank client credit is procyclical, and the credit cycle is more volatile than the business cycle (see Chart 1). The possibility of a credit boom arising is also indicated by the observation that differences in relative changes in bank client loans in the domestic economy tend to widen with growth in relative changes in real GDP.

Disinflationary and deflationary pressures have caused central banks in many advanced economies to pursue monetary policies based on very low interest rates or on interventions to weaken their domestic currencies. In some cases, this monetary easing has been accompanied by quantitative easing. Against this backdrop, some of these economies are starting to show tendencies that might become a source of systemic risk. Some national authorities have already responded by setting non-zero countercyclical capital buffer rates or tightening their regulations on property exposures. According to CNB analyses, the Czech economy was near the bottom of the financial cycle during 2014 and lending was recovering only gradually.[8] At the same time, however, the CNB deems it necessary to deploy preventive tools for the eventuality of an overheating of the residential and commercial property markets which are able to moderate any excessive future credit expansion. For that reason, the CNB formulated a set of recommendations for credit institutions providing retail loans secured by residential property (see section 4.4).

CHART 1

ANNUAL REAL GDP GROWTH AND BANK CLIENT LOANS
(%)



Source: CNB and CZSO
Note: The 2014 Q4 GDP data represent a preliminary estimate and the data for 1994–1996 are the authors' estimate.

In light of the current situation, we simulate below the effects of changes in the monetary conditions, the capital adequacy ratio of banks and house prices. This simulation illustrates the need to coordinate monetary and macroprudential policies given the risks associated with credit growth and house price growth. For illustration, one typical tool is chosen for each policy: short-term interest rates for monetary policy and capital requirements for macroprudential policy.[9]

4.1 A VAR model with a large number of variables

We employ a Bayesian vector autoregression (BVAR) model to analyse the impacts of changes in monetary and financial conditions. VAR models are routinely used to analyse monetary transmission and as an ancillary tool in inflation forecasting. Usually, however, they work with only a few variables and cannot be used to assess the interaction of monetary and macroprudential policies. This problem can be overcome by using a large BVAR model, which allows us to conduct our analysis on a much larger number of variables by making an assumption about the prior distribution of the parameters. BVAR models have been shown to outperform simple VAR in forecast accuracy (Banbura et al., 2010). They are also suitable for analysing time series of limited length, as in our case.[10]

8 For details, see the assessment relating to the Provision on setting the countercyclical capital buffer rate on the CNB website (Financial stability > Macroprudential policy > The countercyclical capital buffer).

9 For both policies, the effects are analysed under standard conditions. We therefore abstract from situations that might arise during an acute banking crisis or at the zero lower bound on interest rates.

10 With the standard VAR model the number of variables is limited by the length of the time series, which is short in the Czech Republic. In such case, only a limited number of variables can be included in the model. This

The initial VAR(p) model is defined as follows:

$$Y_t = c + \sum_{j=1}^{p} A_j Y_{t-j} + u_t \qquad (1)$$

where $Y_t = (y_{1,t}, y_{2,t}, \ldots, y_{n,t})'$ is a vector of endogenous variables, u_t is a vector of residuals with distribution $N(0,\Sigma)$, $c = (c_1, \ldots, c_2)'$ is a vector of intercepts and A_j is a matrix of coefficients.

The prior follows a Normal inverted Wishart distribution (Litterman, 1986; Sims and Zha, 1998; Banbura et al., 2010, among others).[11] In estimating and setting the prior distribution, we follow Banbura et al. (2010). First, we estimate a small benchmark VAR model[12] composed of several key variables – the industrial production index, the consumer price index, nominal short-term interest rates and the nominal exchange rate. The choice of these variables hinges on the nature of the Czech economy (a small open economy where the central bank targets inflation using a reaction function close to the Taylor rule). In the next step, we set the prior for the large BVAR model so as to control for overfitting of the model.[13]

To identify the interaction between monetary and macroprudential policies together with the relevant transmission channels as accurately as possible, we need to include as much of the available information as possible in the analysis. For this reason, we use a set of 114 variables for the period of January 2002 to October 2014 with a monthly time frequency. Banbura et al. (2010) showed that by setting an appropriate prior in relation to the model size, BVARs can be estimated even for such a large number of variables. The same methodology was used to analyse monetary policy transmission and risk premium changes on Hungarian data, where the inclusion of a large number of variables better explained the transmission mechanism and led to an increase in the forecasting performance of the model compared to a VAR model with a limited number of variables (Carare and Popescu, 2011).

The set of variables can be divided into six blocks: (i) the real economy (the industrial production index, the construction production index, retail sales, the housing market, GDP expenditure); (ii) prices and wages (the consumer price index, the industrial producer price index, house prices, real wages); (iii) the labour market (the general unemployment rate, the registered number of employees, job vacancies), (iv) money and credit aggregates; (v) financial variables (interest rates, exchange rates, the market index, etc.); (vi) the external environment.[14]

4.2 Effects of changes in the monetary conditions, the capital adequacy ratio and house prices

Monetary policy authorities normally use short-term nominal interest rates or the exchange rate to achieve price stability. Macroprudential policy can be conducted using a whole range of tools, which can have both cyclical and structural effects (ESRB, 2014). On a general level, these tools can, for simplicity, be divided into two groups. The first acts via changes in capital requirements. The second affects the credit supply and demand conditions. For the purposes of this article, a monetary policy easing is represented by a reduction in the short-term nominal interest rate.[15] The effect of a macroprudential policy tightening is then proxied by an increase in the capital adequacy ratio (the ratio of regulatory capital to risk-weighted assets of banks).[16] Note that changes in bank capital adequacy ratios caused by changes in prudential requirements cannot be distinguished from changes due to other factors.[17] Given the small number of observations for which the capital adequacy ratio changed "exogenously" because of a decision made by the regulator, the simulation results should be interpreted with caution.

The reduction in short-term nominal interest rates (a negative shock) and the increase in the capital adequacy ratio (a positive shock) are identified by recursively applying the Cholesky decomposition to the covariance matrix. For this purpose, the panel of variables is divided into two

can potentially distort the results of the analysis and reduce the forecasting performance of the model.

11 The prior distribution is based on the Minnesota prior, which is extended to the inverted Wishart distribution for the covariance matrix of the residuals. The main advantage of this distribution is that it allows the posterior distribution to be derived analytically and eliminates the need to simulate it.

12 This small benchmark model is only used to set the "tightness" of the parameters and has no further implications for the final analysis.

13 If the model is overfitted to the training data it will learn relationships that are not present in the data.

14 All the variables, along with their transformations and prior distributions, are listed in an electronic appendix on the CNB website.

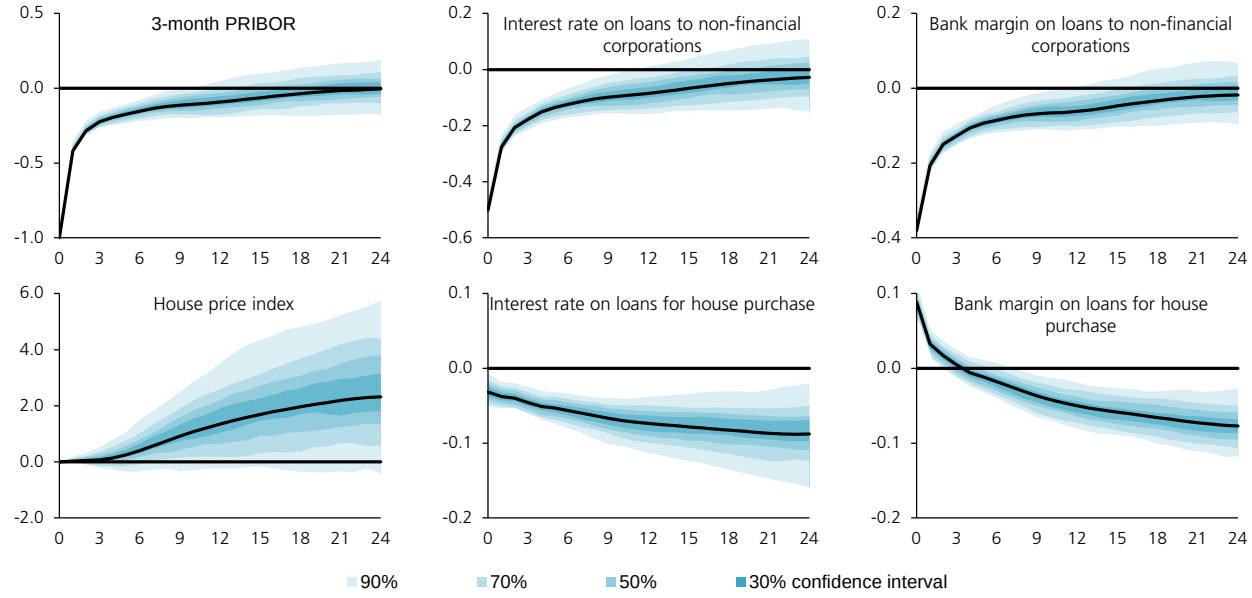
15 The CNB's main monetary policy tool is the two-week (2W) repo rate. As the repo rate does not change continuously, it is proxied by the three-month interbank PRIBOR, which is strongly correlated with the 2W repo rate (0.98 for our time series).

16 A similar approach to analysing the impact of changes in the capital requirements using VAR models was presented, for example, in Noss and Toffano (2014) and Berrospide and Edge (2010).

17 Only part of the changes in the capital adequacy ratios of individual banks reflects the regulator's specific requirements. Banks routinely increase their capital adequacy ratios above the regulatory minimum autonomously due to "collective" market pressure or as a forward-looking response to expected or announced regulatory changes.

CHART 2

EFFECT OF AN EASING OF THE MONETARY CONDITIONS
(%; x-axis: months)



Source: CNB and CZSO, authors' calculations
Note: The chart presents impulse responses to a negative monetary shock with the corresponding posterior Bayesian confidence intervals.

categories: slow- and fast-moving (Stock and Watson, 2005; Banbura et al., 2010). The assumption is that slow-moving variables display a lagged response to a shock while fast-moving ones react contemporaneously.

In the monetary policy shock identification, the blocks describing the external environment, the real economy, prices and wages, and money and credit aggregates fall into the slow-moving category (in the given order). The remaining variables are classed as fast-moving. In the macroprudential policy shock identification, the increase in the capital adequacy ratio is ranked behind the block of variables for interest rates and credit aggregates (the ordering of the other variables is the same as for the monetary policy shock). This reflects the assumption that capital adequacy ratios have a delayed effect on the real economy and lending, whereas variables characterising the real economy and credit aggregates affect capital adequacy ratios immediately. The delay is due to the fact that it takes time to implement changes to the capital adequacy ratio into loan agreements (Berrospide and Edge, 2010).[18]

The effects of a monetary easing, a capital adequacy ratio increase and a house price increase are presented graphically using impulse responses, which show the response of selected variables to the identified shock and the propagation of that shock over time.[19] Our methodology makes it possible to illustrate how a monetary shock transmits to the Czech economy not only via the commonly highlighted channels (the interest rate and exchange rate channels), but also through the asset price channel.[20]

A monetary easing in the form of a reduction in short-term interest rates transmits quickly to lending rates.[21] This pass-through is stronger in the non-financial corporations sector than in the household sector (see Chart 2).[22] This reflects how loans are priced in these sectors. Rates on loans to non-financial corporations are tied largely to the interbank rate,

18 In tests of the robustness of the estimates, the capital ratio ranked ahead of credit aggregates. Changing the ordering has no significant effect on the resulting impulse responses of the selected variables.

19 The size of the dataset makes it impossible to present all the impulse responses here. Only relevant variables were selected for the analysis. The full dataset is given in an electronic appendix on the CNB website.

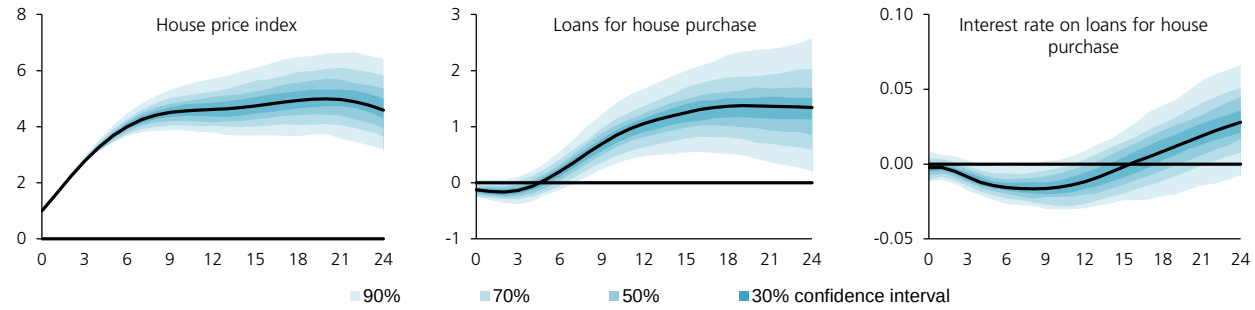
20 An easing of the monetary conditions in the economy generally leads to growth in real activity and prices and to depreciation of the exchange rate, with the impact peaking in 3–4 quarters. This is consistent with estimates in previous studies for the Czech economy (Borys and Horváth, 2009; see the electronic appendix).

21 The analysis Transmission of financial market interest rates to retail interest rates published in Inflation Report II/2009 (CNB, 2009) produced a similar result.

22 The interest rates in Charts 2–4 pertain to the stock of loans.

CHART 3

EFFECT OF AN INCREASE IN HOUSE PRICES
(%; x-axis: months)



Source: CNB and CZSO, authors' calculations
Note: The chart presents impulse responses to a positive shock to the house price index with the corresponding posterior Bayesian confidence intervals.

whereas in the household sector a much larger proportion of interest rates are fixed. In the household sector, rates on loans for house purchase, consisting mostly of mortgages, go down the most. Only around a quarter of these loans have a floating rates or rates fixed for up to one year. As interest rates fall, banks' margins on loans to non-financial corporations decrease, while their margins on loans for house purchase initially increase. This may indicate greater competition and stronger links to clients in the segment of lending to non-financial corporations.

Margins on loans for house purchase start to fall in the third period after the initial monetary easing. This is caused by a longer-lasting decline in interest rates on loans for house purchase. This effect is again associated with the fixed interest rates on a large proportion of loans for house purchase. As the interbank rate goes down, banks' costs decrease but their revenues from such loans stay constant. In time, these types of loans are revalued and the margin starts to fall.

An easing of the monetary conditions passes through to growth in house prices and therefore also in the value of collateral. A monetary policy easing thus improves borrowers' balance sheets. However, if this improvement is used to increase the loan amount, it also gives rise to increased financial risk. If house prices suddenly drop and the default rate simultaneously rises, loans will be less well secured than banks originally expected.

The effect of a change in house prices can be seen from the response of the economy to a shock to the house price index (see Chart 3). A one-off increase in house prices leads to an expansion in loans to households for house purchase and a decline in the rate on such loans. Lending rates may go down in response to the increase in house prices (due to a decrease in the risk premium caused by higher collateral value).

An increase in the capital adequacy ratio leads to a gradual decrease in the loan stock and in house prices. The interest rate in the non-financial corporations sector stays flat in the first three quarters and then starts to go down in response to a fall in the money market rate. In the household sector, the interest rate steadily rises due to a reduction in collateral value resulting from the fall in house prices (see Chart 4).

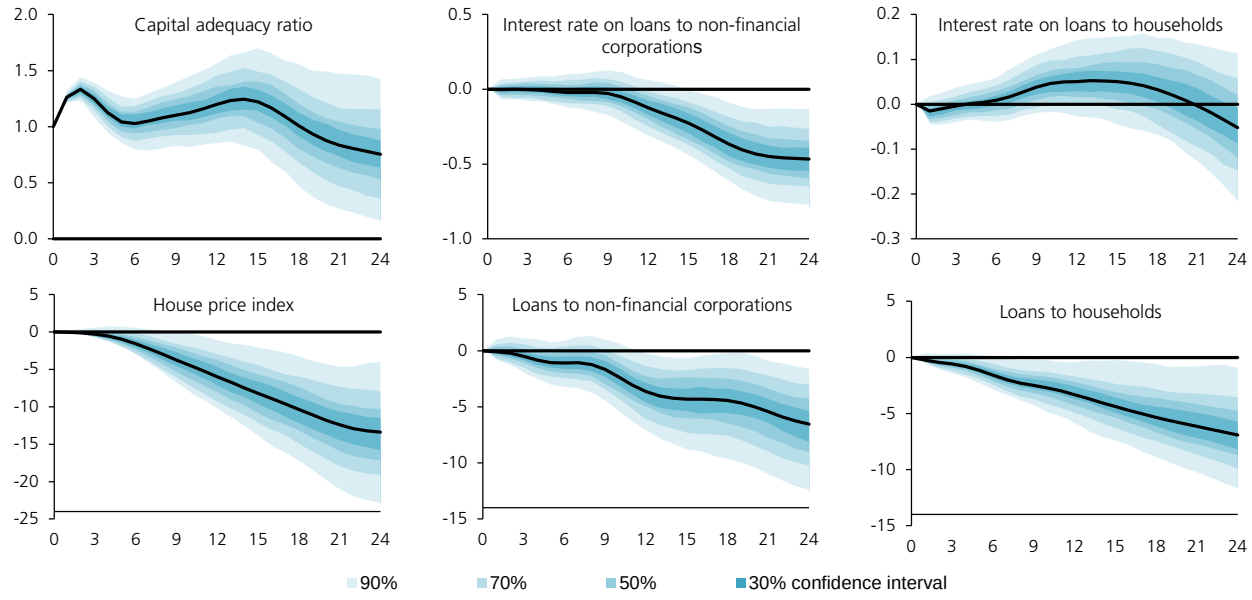
5. CONCLUSION

The growing debate about the effect of sustained easy monetary conditions on the formation of financial imbalances raises a question about the interaction of monetary policy and financial stability policies. Monetary policy has to seek a compromise between stabilising prices and stabilising output, while macroprudential policy is concerned with finding a compromise between adequate returns and acceptable risks. The interactions between these compromises make it necessary to set monetary and macroprudential policies simultaneously. The optimal mix of the two depends on the current position of the economy in the financial and business cycle, the structural characteristics of the financial system and the types of shocks faced by the economy at any given moment.

Monetary and macroprudential policy tools are not independent, as they affect both the monetary and credit conditions via their effect on credit growth. Our analysis, conducted using a Bayesian vector autoregression model, reveals that a conflict can arise between the two policies under certain conditions in the Czech economy. Easy monetary policy fosters growth in the prices of assets that

CHART 4

EFFECT OF AN INCREASE IN THE CAPITAL ADEQUACY RATIO
(%; x-axis: months)



Source: CNB and CZSO, authors' calculations
Note: The chart presents impulse responses to a positive shock to the capital adequacy ratio with the corresponding posterior Bayesian confidence intervals.

can be used as collateral when applying for a loan. By contrast, a macroprudential tightening leads to a reduction in asset prices and a slowdown in credit expansion. It can be very difficult to decide on the optimal policy mix in reality. Macroeconomic forecasts tell us about risks expected in the short run, whereas financial stability analyses reveal potential vulnerabilities in the financial system in the longer run. Naturally, therefore, monetary policy tools are rarely used to achieve the objective of financial stability. Sometimes, however, macroprudential policy tools may not deliver a strong enough effect or may not be immediately activatable. In such case it may be necessary to deploy monetary policy tools, if only as a second-best solution.

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A COMPREHENSIVE METHOD FOR HOUSE PRICE SUSTAINABILITY ASSESSMENT

Michal Hlaváček, Hana Hejlová

This article describes the house price equilibrium assessment process used by the CNB in its decision-making on macroprudential measures intended to mitigate risks associated with loan financing of residential property purchases. It first explains why it is necessary to use multiple models simultaneously to correctly assess house price sustainability. It goes on to describe the approaches the CNB currently applies to estimate house price misalignment and discusses their results. It then presents a method for aggregating the estimates produced by those approaches and provides an aggregate assessment of the results. This method indicates that Czech house prices were roughly at their equilibrium level in mid-2014 following an extended period of slight undervaluation since the third quarter of 2009.

1. INTRODUCTION

The macroprudential policy tools currently applied in European countries include forms of regulation of property market exposures.[1] According to research results and international experience, however, these measures are only effective if introduced in good time (ESRB, 2014). The possibility of applying such tools where necessary to maintain financial stability puts authorities under pressure to monitor property prices, assess house price sustainability and refine the methods they use for such assessments. The CNB has been assessing the evolution and sustainability of property prices in its Financial Stability Reports since the first FSR 2004. Advanced approaches have been described in articles by Hlaváček and Komárek (2009, 2010, 2011). This article sets out to update the previously applied approaches to assessing residential property prices, describe newly developed approaches and formulate a method for aggregating the results of the various approaches.

The above macroprudential tools are intended to prevent financial institutions from suffering large credit losses at times of highly adverse economic conditions coupled with a sharp drop in house prices. An indirect consequence of these tools is that they constrain growth in house prices per se. However, the objective of macroprudential policy is not to combat house price inflation, but to prevent *systematic and credit-driven overvaluation*, after which house prices have a tendency to drop sharply. Such events have grave implications for the real economy and the financial system.[2] One example of the "right" sort of property price growth is the case of a positive technology shock, with rising productivity leading to growth in wages and housing demand and, in turn, to growth in house prices. An example of the "wrong" sort of growth is a situation where the initial "right" property price growth is misperceived by households and leads to expectations of future price growth. Fearing a further rise in prices, or seeking a "good" investment, households increasingly buy housing on credit. This pushes prices up further, above the level caused by the initial rise in productivity. Identifying situations where property prices are being determined by fundamental factors rather than expectations, i.e. identifying equilibrium prices, is a key problem in the assessment of house prices.[3]

This article is organised as follows. Section 2 discusses differences in approaches to assessing equilibrium house prices. Section 3 describes specific forms of these approaches as used by the CNB to estimate the house price gap. Section 4 presents a method for aggregate assessment of the results of such approaches. Some approaches to assessing house prices have been described in previous Financial Stability Reports. However, these methods have gradually been updated and new ones have been added as the Czech property market has developed. Even so, the methodology is not fixed and final. The methods for assessing equilibrium residential property prices may be updated and further supplemented in response to market changes, as happens in most countries with a longer free housing market history than the Czech Republic. The method presented in this article for the aggregate assessment of various estimates allows for such ongoing refinement.

1 The most common are limits on the loan-to-value (LTV) and loan-to-income (LTI) ratios and increased risk weights for the calculation of capital requirements for loans. For a description of these measures, see section 5.4 of FSR 2013/2014, pp. 99–102.

2 "*The job of macroprudential policies is to ensure that the financial system does not become so vulnerable that the shocks ultimately cause financial instability in the form of a crisis.*" (Frait and Komárková, 2011)

3 The definition of equilibrium house prices in Himmelberg et al. (2005).

2. THE BENEFITS OF DIFFERENT APPROACHES TO ASSESSING PROPERTY PRICES

The estimation of equilibrium residential property prices is complicated by whole range of factors. These include (i) low data quality due to the heterogeneity of the underlying asset; (ii) the convergence nature of the Czech economy, which has undergone rapid mortgage market development and housing market liberalisation; (iii) rent deregulation, which continued until 2012 (see also Hlaváček and Komárek, 2009), (iv) the importance of the construction industry for economic activity, (v) the degree to which property purchases are debt-financed, and (vi) the combined consumption and investment nature of housing.

Equilibrium residential property prices should be explainable primarily by the determinants of demand (e.g. demographic indicators, the income situation of households and interest rates) and supply (e.g. prices of land and building work and the size of the housing stock; see Approach I applied by the CNB). Potential errors in the valuation of residential property prices can arise in various ways and go in either direction. On the one hand, the omission of a potentially significant fundamental house price factor can mean that the approach wrongly assesses house price growth driven by that factor as equilibrium growth. On the other hand, if the factors explaining house price growth include one which itself contains a non-equilibrium component, that factor may contribute to house price growth being assessed as equilibrium growth and the degree of overvaluation being underestimated. The probability of such an error is higher if the relationship between house prices and this fundamental factor is endogenous, i.e. if these fundamentals are themselves driven by the emerging price bubble. In such case, even "wrong" house price growth may be mistakenly explained by fundamentals. Such a situation can arise, for example, when growth in residential property prices and increasing demand for housing generate excessive activity by property developers, who, in the search for yield, create a construction boom.[4] The increased construction activity leads to faster economic growth and a related surge in wages. The rise in residential property prices is thus accompanied by an improvement in household income, even though the whole process was started by over-optimistic expectations about housing demand. For this reason, to correctly assess house price sustainability it is also vital to monitor aggregate economic relationships in a potentially overheating economy (see Approach II applied by the CNB).

Assessments of house price equilibrium can also differ depending on whether prices are assessed on the basis of consumption or investment demand for residential property. This applies even though the two types of demand are strongly interconnected (residential property investors buy property for others to "consume" by purchasing services, i.e. paying rent) and the general model of housing supply and demand thus usually contains their determinants already.

From the perspective of demand for property for use (i.e. consumption demand), house price sustainability is assessed using the ratio of the property purchase price to the income of households. At any stage of the price cycle, this ratio tends to be so high that, given the need to pay for other essential goods,[5] it constrains further growth in house prices to some extent (see Approach IV applied by the CNB).

From the viewpoint of demand for housing as a good of permanent value (i.e. investment demand) residential property price equilibrium is evaluated by comparing the economic sense of home ownership with a suitable alternative. In the case of demand for housing for use, the cost of buying is compared with the cost of renting. From the investor perspective, the rental return is compared with the return on another, typically less risky asset. Such equilibrium residential property prices also satisfy the condition of arbitrage between alternative asset markets (see Approach III applied by the CNB).

So, one consequence of the nature of residential property is that there are numerous approaches to assessing equilibrium house prices. A single approach would be too narrow both from the methodological perspective and because of the need to limit the number of variables given the length of the time series. Assessment of the effects of supply and demand-side factors typically leads to econometric approaches, whereas the pressures of consumer and investment demand independently are usually assessed statistically. The individual approaches to assessing residential property price equilibrium are not pure alternatives; each provides some additional information for evaluating price equilibrium.

4 A well-known recent example with negative impacts on the real economy and the financial system is the construction boom in Spain.

5 The household expenditure structure is largely economy-specific. This means that international comparisons of the ratio of housing expenditure to the total budget of households cannot be used to assess residential property prices.

Central banks around the world differ widely in their approaches to assessing house price equilibrium. Some of them limit themselves to simple statistical indicators, which they combine analytically in a suitable manner. Others are phasing in econometric models, which are then regularly estimated and used to supplement statistical indicators. The CNB, like the Belgian, German, Italian and Irish central banks, for example,[6] has so far used a combination of statistical and model-based approaches. It has always tried to make maximum use of equilibrium house price information (see the previous discussion and Approaches I–IV applied by the CNB).[7] However, the growing range of options for using macroprudential measures to safeguard financial stability is giving rise to a need to assess residential property price equilibrium information from various approaches on an aggregate basis and thereby reach clear conclusions on house price misalignment. However, we are aware of only two previous attempts to aggregate information on equilibrium house prices from multiple indicators and models. The first is the method of the ECB, which uses four approaches to determine property price equilibrium – two model-based ones and two statistical ones.[8] The price equilibrium information obtained in this way is evaluated as an average, taking other ancillary indicators into consideration (see ECB, 2011). The Austrian central bank (OeNB) created a fundamental residential property price indicator by first identifying key indicators of price stability from the perspective of households, investors and the economic system (e.g. real residential property prices, affordability, the price-to-rent ratio and the ratio of residential property prices to construction costs). These indicators are then aggregated into a house price sustainability index using the principal components method, and the fundamentally justified price is assessed in relation to the historic average value of this index (Schneider, 2013). The CNB intends to employ a combination of the two approaches described above to assess such information. In contrast to the OeNB's purely statistical approach, the CNB plans to use both statistical and existing model-based approaches, as the ECB does. In contrast to the ECB, on the other hand, it attempts to set the weights for the aggregation of these approaches in a non-arbitrary way, as the OeNB tries to do.

3. APPROACHES TO ASSESSING EQUILIBRIUM PROPERTY PRICES USED BY THE CNB

The CNB has published results of equilibrium property price assessments in its Financial Stability Reports regularly since 2004. It currently employs four approaches – two model-based ones and two statistical ones.

Owing to the high degree of heterogeneity of the family house and apartment block segments, house price sustainability is assessed on the apartment segment only. Approaches I, II and IV use data on apartment transaction prices published by the CZSO, which are available at quarterly frequency since 1999. Approach III draws on asking prices of apartments from the Institute for Regional Information, for which there is also corresponding data on rents. These data are available since 2000 at annual frequency and since 2007 at quarterly frequency. For each approach, we use the longest available data sample to assess equilibrium property prices, taking into account the length of the time series of the variables considered. Use of house price misalignment estimates from all four approaches simultaneously is possible from the second quarter of 2000 onwards.

3.1 Approach I: General supply and demand model

The first approach to assessing equilibrium residential property prices, described in detail in FSR 2008/2009 (Hlaváček and Komárek, 2009),[9] is a housing supply and demand model. As the measure of house price misalignment is that part of the price which is not explained by the variables considered in the model, this approach is based on including as many housing supply and demand determinants as possible (see Table 1 for a list of the variables included in the model). Compared to the model presented in FSR 2008/2009, an important piece of information – the size of the housing stock per 1,000 inhabitants – had to be omitted from the explanatory variables due to a break in publication of the number of cancelled apartments by the CZSO. If this series is resumed, information on the number of apartments will be included in the model again, as we believe that

6 For a description of the models used by other central banks, see, for example, Kajuth et al. (2013), Nobili and Zollino (2012) and McQuinn (2004).

7 In this article we focus on comparing approaches to assessing house price equilibrium for macroprudential policy decision-making. For an exhaustive survey of the existing methods for estimating and evaluating equilibrium house prices, including a list of applications to the Czech Republic, see Hlaváček and Komárek (2010).

8 The CNB uses the same number of approaches. As residential property markets are largely country-specific, price sustainability assessment approaches tend to differ from country to country. The ECB method described above is applied to eight countries. Given the universal application of the same approaches to all those countries, however, the resulting estimates obtained using the individual approaches within each country differ widely.

9 A similar model is presented by Égert and Mihaljek (2007).

excess demand/supply explains apartment price dynamics better than the currently used information on apartment completions.[10] The model therefore temporarily includes at least the number of apartment completions per 1,000 inhabitants.

Given the number of variables included in the model, equilibrium apartment prices are estimated by means of a single equation by linear regression, without including lags for the explanatory variables. Owing to the properties of the time series (some of which were assessed as stationary and others as integrated in first differences), the variables were incorporated into the model in logarithmic levels or differences (for a description of the transformations of the variables in the model, again see Table 1). For this reason, the explained variable is apartment price growth and the degree of misalignment is calculated from the residuals of the estimate.

This supply and demand model indicates that apartment prices were overvalued in 2000 Q2–2004 Q4, in 2007 Q1–2008 Q3 and from 2013 Q3 to the present, and undervalued in 2005 Q1–2006 Q4 and in 2008 Q4–2013 Q2. The model estimates negligible overvaluation of 0.26% for 2014 Q2.

A disadvantage of this model is that the large number of variables precludes the estimation of multiple equations. Consequently, this model cannot capture the endogenous links between house prices and some variables (such as land prices and rents) and may thus underestimate the deviation of prices from equilibrium. One advantage, by contrast, is that it includes supply factors, the omission of which from similar models in other countries is often criticised.

A similar model is estimated using panel regression on annual data for the individual regions of the Czech Republic. This allows us to capture the heterogeneity of property prices across regions.[11]

3.2 Approach II: Accelerator model

The second approach to estimating the gap in apartment prices is based on the long-run relationship between the business and credit cycle and the house price cycle (see, for example, Tsatsaronis and Zhu, 2004, Zhu, 2005, and Borio and McGuire, 2004). In simplified terms, higher economic growth fosters an increase in demand for housing via the income effect. Rising property prices meanwhile boost economic growth through rising construction activity. The significance of loans is that they facilitate the purchase and construction of property and thus support this process. This effect is amplified by the improving income situation of loan applicants and the rising value of loan collateral (see the thematic article *The central bank's primary objectives and the interaction of monetary and macroprudential policies in the pursuit of those objectives* in this Report).

The long-run equilibrium relationship between the business and credit cycle and the house price cycle is estimated using a vector error correction model (VECM).[12] In this model, the cycles are proxied by GDP, loans for house purchase and the transaction price index respectively. The VECM structure ensures that all three variables are explained as being endogenous, i.e. as influencing each other. The model involves estimating both the long-run equilibrium relationship between the variables and the short-run dynamics whereby the variables return to equilibrium after straying from it. The long-run relationship is estimated in the model by the Johansen cointegration technique, which

TABLE 1

VARIABLES AND THEIR TRANSFORMATIONS IN THE HOUSING SUPPLY AND DEMAND MODEL (APPROACH I)

Supply determinants	Demand determinants
Land prices (d)	Marriage rate
Construction output price index (d)	Divorce rate
No. of completed apartments excluding ABs	Natural population growth
No. of completed apartments excluding ABs/1,000 inhabitants (d)	Unemployment rate
	Rate of economic activity
	Vacancies/labour force
	Monthly wage (d)
	Loans for house purchase (d)
	Interest rate (1Y PRIBOR)
	Ratio of FDI to GDP
Apartment prices (d)	
Rents (d)	

Source: Authors' calculations based on CNB, CZSO, IRI and MRD data
Note: "d" denotes first difference.

10 The number of apartment completions may affect the price level rather because new apartments tend to be more expensive than older ones with similar characteristics.

11 See Hlaváček and Komárek (2010) and Mikhed and Zemčík (2009).

12 For applications of similar models, see Gimeno and Martinez-Carrascal (2010) for Spain and Iacoviello (2002) for European countries.

makes it possible to identify multiple relationships of this type in a system of more than two variables.

The misalignment of residential property prices is measured as the difference between the current price and the price given by this long-run relationship, i.e. as the deviation from the long-run equilibrium price. In this case, we depart from the methodology applied by some other central banks that use VECMs to assess equilibrium house prices (e.g. ECB, 2011) and consider the residuals of these models as representing the departure of prices from equilibrium. As we are evaluating property price equilibrium from the perspective of the impact of house prices on household and bank balance sheets, which tend to contain such property for long periods (very often at least for the maturity of the mortgage in the case of banks and for a large part of the client's lifetime in the case of households), we consider it more appropriate to abstract from the short-run equilibrium dynamics estimated by VECMs.

Given the properties of the time series, we opted for a VECM with a linear trend in both the long-run relationship and the short-run dynamics. The inclusion of this linear trend is motivated by the convergence of house prices to the long-run equilibrium level, which started with the deregulation of property prices and to some extent will persist for the entire period of convergence of the Czech economy. As GDP has a lagged effect on wages and other relevant variables, we then had to incorporate a sufficient number of lags into the model. In light of the data frequency, a lag of four quarters was chosen.

The model defined above, much like the preceding one, indicates that apartment prices were overvalued in 2002 Q2–2004 Q3, in 2007 Q3–2009 Q3 and from 2013 Q3 to the present, and undervalued in 2000 Q4–2002 Q1, in 2004 Q4–2007 Q2 and in 2009 Q4–2013 Q2. The model again indicates overvaluation of 2.1% for 2014 Q2.

The results reveal a relative narrowing of the estimated deviations of apartment prices from equilibrium over time, closer to the estimates obtained using Approach I. This is probably due partly to the estimation method, as the speed of this house price convergence (which, due to the use of a linear trend, is implicitly considered constant) is falling in reality because the bulk of the equalisation process has already occurred (the speed of adjustment probably falls as the gap in long-run equilibrium prices narrows). For this reason, earlier overvaluations and undervaluations estimated by the model may be larger and smaller respectively than they were in reality, whereas for more recent periods the opposite may apply (i.e. the overvaluations and undervaluations estimated by the model may be smaller and larger respectively). However, another possible explanation is a "bottom-up" price bubble, with fundamentals temporarily slowing down and lagging behind apartment prices.

3.3 Approach III: Economic sense of home ownership

A metric frequently used by central banks to assess whether investing in residential property makes economic sense is the ratio of the apartment price to the annual rental costs (the price-to-rent ratio). This tells us the number of years a household would spend renting before being better off owning.[13] However, some authors (see, for example, Himmelberg et al., 2005, and Poterba, 1984) point out that this metric overestimates the benefits of investing in residential property, as it fails to take account of many of the other costs associated with property ownership over and above the purchase price. They propose comparing the annual costs of renting with the annual costs of owning. The latter include, among other things, mortgage interest costs net of tax deductions, property taxes, depreciation and the opportunity cost of the capital invested, less anticipated capital gains (Himmelberg et al., 2005).

Given the prevalence of mortgage financing of residential property purchases in the Czech Republic and the tax deductibility of mortgage interest payments, we feel it is appropriate to consider other costs and savings when assessing the financial benefits of investing in residential property. However, when assessing house price misalignment we cannot rely solely on the aforementioned authors' approach, as it expresses the overvaluation of the annual costs of owning and not the overvaluation of the total costs associated with owning. The approach involves "annual" incorporation of interest costs into the total costs of owning without allowing us to differentiate the varying distribution of the costs of owning over time. It therefore fails to reflect an important aspect of owner-occupied housing as a store of value: the costs associated with owning may be high at first, but fall substantially over the life of the mortgage.

For this reason, to assess the house price gap we opt for a method based on the ratio of the rent to the purchase price. However, we adjust this metric for mortgage servicing costs net of tax deductions for mortgage interest. We call this the "adjusted price-to-rent ratio". For this purpose, we consider a "standard" mortgage with an LTV of 65% and

13 The inverse thus represents the investor's rental return on the property.

a repayment period of 20 years.[14] Based on these parameters, we use the market interest rate on loans for house purchase and the current income tax rate to calculate interest costs net of tax deductions. Together with the purchase price, these costs make up the total housing costs. Unlike Himmelberg et al. (2005), we do not consider anticipated capital gains, the opportunity cost of the capital used to purchase housing or the tax costs associated with property ownership. The rapid rate of convergence of property prices to their long-run equilibrium levels makes it hard to set a realistic figure for anticipated capital gains. When developing this approach, we replaced the anticipated capital gain rate with the average rate of growth of apartment prices for the available time series, with the moving average of the annual rate of growth for a period of certain length, and with the rate of growth obtained by smoothing the property transaction price data using the HP filter with a high smoothing parameter. However, all these attempts produced unsustainable anticipated capital gains figures, confirming that this approach is not suitable for application to the Czech Republic. We additionally assume that when the return required by investors is held constant, growth in residential property prices is gradually reflected in an increase in rents and hence is not a factor that favours either alternative – housing or investment. Next, a decision to rent does not turn capital that would otherwise have been invested in buying a home into completely free funds. Instead, this capital is gradually consumed on rent, so the opportunity costs are also smaller in the long run. The property transfer tax rate was constant for most of the period under review and is therefore not relevant to the method for assessing this indicator.

A standard way of assessing statistics such as this is to determine their deviations from the supposed equilibrium level. The average for a sufficiently long and suitably chosen period or the trend obtained by means of the HP filter is usually chosen as the equilibrium value. We opt for the latter because the equilibrium levels of the indicator can also vary over time, just like they vary across countries and regions (Himmelberg et al., 2005). In such case, results determined on the basis of a constant value would be significantly biased. In any case, the HP filter remains the only currently viable way of assessing the price-to-rent ratio for the Czech Republic, mainly because of a lack of data and the aforementioned short history of the free housing market in the Czech Republic. In addition, the timing of property market liberalisation differed from that of rent deregulation until 2012.

Our assessment of the price-to-rent ratio using this method indicates that apartment prices were overvalued in 2000 Q2–2002 Q1, in 2007 Q3–2010 Q3 and from 2013 Q3 to the present, and undervalued in 2002 Q2–2007 Q2 and 2010 Q4–2013 Q2. Following two quarters of slight overvaluation in 2013 Q3 and 2013 Q4, the model again indicates undervaluation of -3.19% for 2014 Q2.

One drawback of this approach, we feel, is that the entire deviation of the metric from the trend is attributed to non-equilibrium house prices. In reality, however, the markets for owner-occupied and rented housing are complements (a decrease in the share of owner-occupied housing leads to a rise in the share of rented housing), so it is reasonable to assume that if prices diverge from equilibrium in one market they will automatically do the same in the other. In our opinion, this approach may thus overstate the true deviation of housing prices from equilibrium.

3.4 Approach IV: Affordability of housing

The most common metric used by central banks to assess property price sustainability is the ratio of the apartment price to the annual income of households (the price-to-income ratio). This tells us how long it takes the average household to earn enough to buy a home.[15] As in the case of Approach III, we consider the interest costs of an illustrative mortgage net of tax deductions in addition to the apartment purchase price. We refer to this metric analogously as the "adjusted price-to-income ratio". As we lack data on the number of households updated at least on an annual basis, we consider individual income (in the form of the real wage) instead of household income.

This metric is considered to be more stable over time than the price-to-rent ratio, but even in this case the equilibrium value can vary over time. However, the short data history for calculating the long-run average again leaves the deviation from the trend obtained using the HP filter as the only possible method for assessing this indicator.

Our assessment of the price-to-income ratio using this approach indicates that apartment prices were overvalued in

14 The Belgian central bank, for example, employs similar assumptions (LTV 80%, repayment period 20 years) to assess the affordability of housing (NBB, 2012).

15 As with the price-to-rent ratio, the annual costs of owning can be considered instead of the total costs of owning. In such case, the ratio tells us what proportion of their income households have to spend on housing. To assess equilibrium property prices, however, we have to use total costs.

2001 Q4–2004 Q1, in 2007 Q2–2009 Q2 and from 2014 Q1 to the present, and undervalued in 2000 Q2–2001 Q3, in 2004 Q2–2007 Q1 and in 2009 Q3–2013 Q4. The model indicates overvaluation of 2.11% for 2014 Q2.

3.5 Comparison of estimates across approaches

The estimates obtained using Approaches I–IV largely agree on the periods of house price overvaluation and undervaluation. The only major differences occur at the start of the period under review, when flaws in modelling the convergence nature of the housing market are apparent for some of the approaches (see Chart 1). However, given that the approaches are supposed to reliably estimate the degree to which houses are misaligned at present, these historical discrepancies do not matter too much.

The approaches differ more widely in their estimates of the magnitude of the deviations. However, the relations between them conform to the assumptions made in section 2. The smallest deviations are estimated by the general supply and demand model, which also considers the widest range of explanatory variables. The accelerator model indicates larger deviations, confirming the synergistic interaction of property prices, economic activity and debt financing. The approaches based on assessing the economic sense and affordability of home ownership also generally estimate larger deviations than the general supply and demand model. This is because these models abstract from other property price factors.

4. AGGREGATE ASSESSMENT OF EQUILIBRIUM HOUSE PRICE INFORMATION

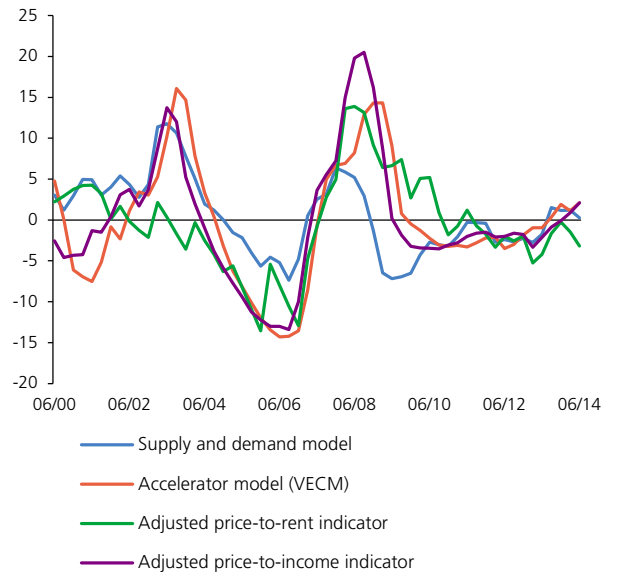
A key issue as regards aggregating the house price misalignment estimates generated by the various approaches is how to set the weights for each of them. This task is complicated by the fact that the true deviation of house prices from equilibrium is not observed ex post and cannot be approximated either. In practice, therefore, we get into a situation where some estimates of price misalignment are "nearer" than others. On the one hand, this may be taken to mean that the former send out strong signals about the deviation of prices from equilibrium, while the latter are not necessarily entirely accurate. On the other hand, the "farness" of the latter estimates may indicate that the former left out fundamental factors that are important price determinants or that the results were influenced to some extent by the estimation method.

The key factor in our choice of aggregation method was the belief that each of our chosen approaches yields additional information and that some of them (especially Approaches III and IV) omit other important house price determinants. Our proposed aggregation method therefore employs two sets of weights reflecting the mutual "nearness" or "farness" of the individual estimates. By weighting the estimates from the various approaches by the two sets of weights separately we obtain two different aggregate estimates of the gap in apartment prices. Between these aggregate estimates, we obtain a range within which we believe the true deviation of prices from equilibrium lies. The "nearness" of the estimates is measured using correlation coefficients and their "farness" is obtained as the complement-to-one of the correlation coefficients. The first set of weights assigns a greater weight to the estimates the more correlated they are with the other estimates. As there is direct proportionality between the mutual correlations and the weight, we will provisionally denote the limit of the resulting interval obtained by weighting the estimates by this set of weights as "+". The other set of weights assigns a greater weight to the estimates the less correlated they are with the other estimates. In this case the weights are indirectly proportional to the correlations between the individual estimates, so we denote the limit of the resulting interval obtained by weighting the estimates by this set of weights analogously as "-" (see Table 2). We can use the average of the upper and lower limit of this interval as a single piece of information for communication purposes.

CHART 1

APARTMENT PRICE GAP ESTIMATES OBTAINED USING DIFFERENT APPROACHES

(%)



Source: CNB, CZSO, IRI, MRD, EC, authors' calculations

TABLE 2

CORRELATION COEFFICIENTS BETWEEN HOUSE PRICE GAP ESTIMATES AND WEIGHTS ENTERING THE AGGREGATE ESTIMATE

	Correlation coefficient				Weight	
	Approach I	Approach IV	Approach III	Approach II	+	-
Approach I	1				18.0%	36.2%
Approach IV	0.59	1			30.6%	16.1%
Approach III	0.28	0.80	1		24.0%	26.7%
Approach II	0.47	0.87	0.70	1	27.5%	21.1%

Source: Authors' calculations.

Given the inaccuracy inherently associated with assessing equilibrium house prices, we consider it important to set a band within which a slightly positive/negative apartment price gap is not regarded as an overvaluation/undervaluation. This "equilibrium house price band" was set as the 95% confidence interval, based on the realistic assumption that the deviations of house prices from equilibrium are normally distributed.

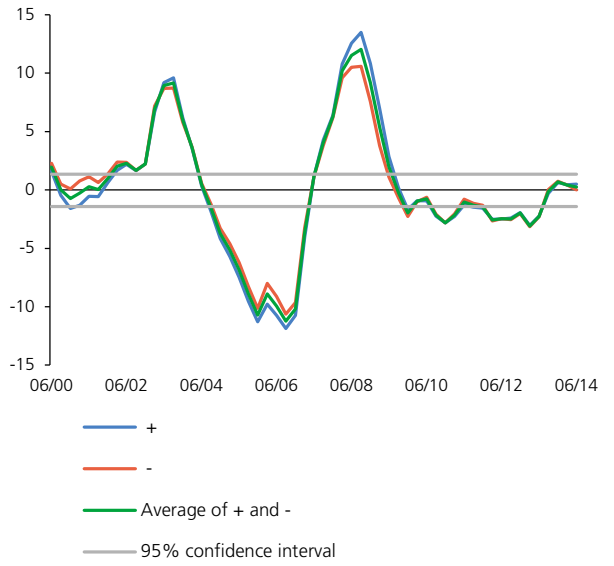
The above method for aggregating estimates from multiple approaches is essentially very similar to the one chosen by the OeNB. Both aggregation methods are based on a correlation matrix between the data intended to be aggregated. The OeNB bases its assessment solely on indicators associated with house price sustainability, which it first aggregates into an overall indicator and only then assesses that indicator in relation to the long-run average. For this reason, the OeNB applies the principal components method to filter out the part of the variability in the input indicators which is not associated with the deviation of house prices from equilibrium. By contrast, the CNB uses a combination of statistical and model-based approaches. This means that some indicators associated with house price sustainability and other variables first enter models that filter out the part of their variability which is not associated with the deviation of house prices from equilibrium and provide information directly on property price misalignment. The two statistical approaches are handled similarly, with both effects (smoothing and assessment) being achieved using the HP filter.

The CNB's approach involves aggregating equilibrium house price information that has already been smoothed and assessed, so we do not need to apply the principal components method to each estimate of the deviation of prices from equilibrium. Consequently, the correlation matrix can be used for the aggregation approach that assigns more

CHART 2

AGGREGATED APARTMENT PRICE GAP ESTIMATE

(%)



Source: CNB, CZSO, IRI, MRD, EC, authors' calculations
Note "+" denotes the weighted average where the estimates from the various approaches are assigned a greater weight the more correlated they are with the other estimates, and "-" denotes the weighted average where the estimates from the various approaches are assigned a greater weight the less correlated they are with the other estimates.

weight to more and less correlated estimates respectively, as described in the previous section.

As the estimates obtained from the different approaches yield very similar information, the interval for the probable deviation of prices from equilibrium obtained in this way is not wide at the moment (see Chart 2). However, the advantages of our aggregation method are fully realised when the individual estimates differ more substantially. Using this comprehensive method for evaluating equilibrium prices, we assess prices as having been overestimated in 2002 Q1–2004 Q1 and 2007 Q3–2009 Q2, and undervalued in 2004 Q4–2007 Q1 and in 2010 Q3–2013 Q2. In 2014 Q2, apartment prices are assessed as being approximately at their equilibrium level.

As mentioned earlier, however, the true overvaluation of property prices is not observable even ex post and its determination is complicated by other difficult-to-estimate factors such as the rate of growth of property prices due to the convergence of the Czech economy. For these reasons, methods that can potentially generate end-point bias are employed to estimate the deviation of house prices from equilibrium. To ascertain whether such bias is present, the full method for assessing property prices was applied to a total of 15 time samples – the entire period under review

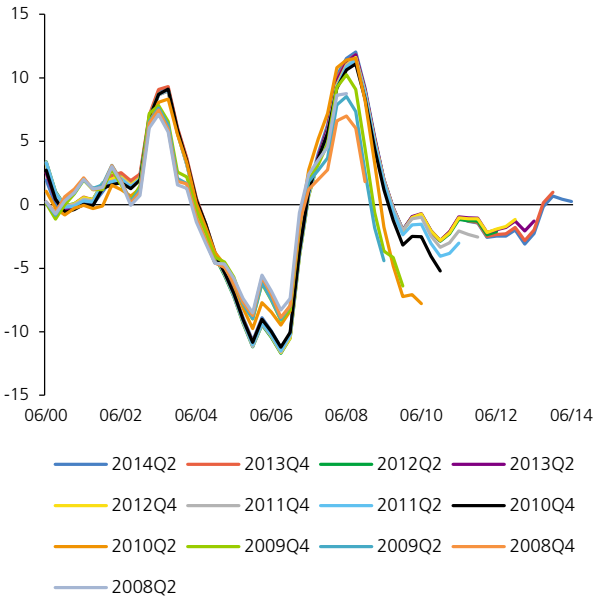
(until 2014 Q2) and another 14 periods, each of them two quarters shorter than the last. The period up to 2010 Q2 was the shortest one for which the deviation of prices from equilibrium was obtained using all four approaches. This period is so short that when it is shortened by a further two quarters the number of observations is not sufficient to estimate the accelerator model using the VECM, which thus generates unrealistic results.[16] The aggregated estimates for the period up to 2009 and shorter periods are thus obtained using the three remaining approaches only. Assessing the significance of end-point bias involves inspecting whether the results for the final quarters of each period were more significantly "revised" by estimation on longer data samples. Chart 3 shows that the aggregated estimates for the individual quarters after 2010 do not differ when estimated on progressively longer data series, so our comprehensive approach to assessing property price misalignment is consistent over time.

However, if we were to conduct an analogous analysis of the "revision" of the estimates on longer data samples in each approach, we would observe less stable estimates at the ends of the periods under review for the adjusted price-to-rent and price-to-income ratios, larger revisions for the supply and demand model and increased inaccuracy for the VECM. The more robust results obtained after aggregating these estimates thus further emphasises the advantages of assessing property price sustainability using a combination of approaches.

CHART 3

ROBUSTNESS ANALYSIS OF THE AGGREGATED ESTIMATE OF THE APARTMENT PRICE GAP

(%)



Source: CNB, CZSO, IRI, MRD, EC, authors' calculations

Note: The data in the legend refer to the final quarter of the data sample considered. Given the low number of observations available for estimating the accelerator model (VECM) for data samples ending in 2009 Q4 and earlier, the aggregated estimate is calculated using the three remaining approaches only.

5. CONCLUSION

In this article we described various methods for assessing equilibrium property prices and a way of evaluating the results of these models in aggregated form. The results indicate that residential property prices in the Czech Republic are currently close to their equilibrium level. The different approaches are sending out very similar signals. As pointed out in similar analyses of house price sustainability conducted by other central banks, the complex structure of the residential property market means that each of the methods has its drawbacks, so the aggregate assessment of their results should also be taken only as a guide. Although the empirical approaches to assessing equilibrium property prices presented in the article provide new insights into the evolution of house prices, assessing property prices still requires expert judgement and is inevitably somewhat subjective. It is important to know the drawbacks of each model used (such as end-point bias) and to assess their significance at the given moment.

16 For this reason, the aggregated result for the shortest period on the longer data sample is also the most significantly "revised", since the VECM has proved to be relatively inaccurate.

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CREDIT PORTFOLIO SECTOR CONCENTRATION AND ITS IMPLICATIONS FOR CAPITAL REQUIREMENTS

Libor Holub, Michal Nyklíček, Pavel Sedlář

This article assesses whether the sector concentration of the portfolio of loans to resident and non-resident legal entities according to information from the Central Credit Register (CCR) indicates a need for additional capital requirements under Pillar 2. A simplified version of the factor model is used for this purpose. The Herfindahl-Hirschman Index (HHI) is employed to indicate the degree of sector concentration and its long-term tendencies. The results of the factor model, which takes account of an institution's risk profile, signal a possible need for additional economic capital for portfolios featuring higher sector concentration and higher risk. In such cases, supervisors should evaluate whether sector concentration risk is correctly measured, assessed and incorporated into capital requirements in the bank's internal capital adequacy assessment process (ICAAP).

1. INTRODUCTION

Concentration of credit risk in asset portfolios is one of the potential causes of large losses in credit institutions documented in the literature (BCBS, 2004) and one of the specific risks subject to supervisory review under Pillar 2 (CEBS, 2010). The reason for this is that concentration risk is not fully reflected in the Pillar 1 minimum capital requirements, as credit portfolios do not satisfy the condition of perfect diversification as assumed by the IRB approaches to the measurement of credit risk (BCBS, 2006).

Concentration risk arises both at the level of individual large exposures (large exposure risk) and from excessive exposure to a single sector or a number of significantly correlated sectors (sector concentration). Large exposure risk is addressed in detail in the EU's Capital Requirements Regulation (CRR), which contains criteria and techniques for assessing it (Articles 387–403). Sector concentration, however, is not subject to detailed regulation.

This article therefore presents a possible methodological approach to this issue based on a simplified version of the factor model (see Düllmann and Masschelein, 2007) and applies that approach to evaluate whether the sector concentration of banks implies a need for additional capital requirements under Pillar 2. It also uses the Herfindahl-Hirschman Index as an alternative indicator of sector concentration risk and its long-term tendencies in order to identify possible new areas of risk accumulation at the macro-level of the banking sector as a whole.

2. REGULATORY FRAMEWORK FOR CREDIT CONCENTRATION RISK

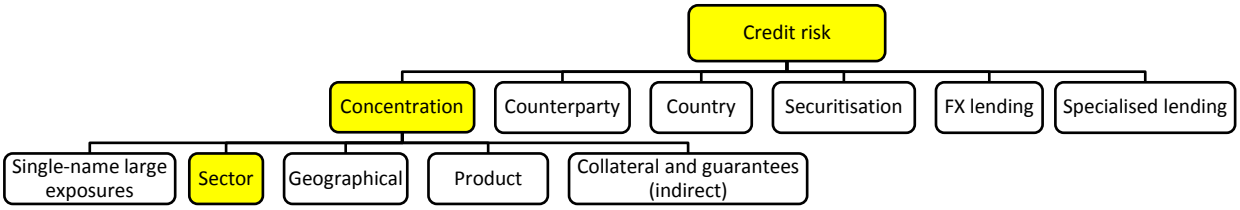
Article 81 of Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (CRD) requires competent authorities to ensure that the concentration risk arising from exposures to each counterparty, including central counterparties, groups of connected counterparties and counterparties in the same economic sector, in the same geographic region or from the same activity or commodity, is addressed and controlled, including by means of written policies and procedures.

Requirements for the evaluation of concentration risk by supervisory activities are also laid down in Articles 144–151 of the *Guidelines on common procedures and methodologies for the supervisory review and evaluation process* (SREP; see EBA, 2014). These guidelines require competent authorities to assess the nature of credit risk by considering at least: (a) credit concentration risk, (b) counterparty credit risk and settlement risk, (c) country risk, (d) credit risk from securitisations, (e) FX lending risk, and (f) specialised lending risk.

When evaluating concentration risk, competent authorities should form a view on the degree of risk that the institution will incur significant credit losses stemming from a concentration of exposures to a small group of borrowers, to a set of borrowers with similar default behaviour or to highly correlated financial assets.

Competent authorities should conduct this assessment considering different categories of credit concentration risk, including: (a) single-name concentrations (including a client

FIGURE 1
CREDIT RISK BREAKDOWN



Source: Authors

or group of connected clients as defined for large exposures – see Articles 387–403 of CRR 575/2013/EU), (b) sector concentrations, (c) geographical concentrations, (d) product concentration, and (e) collateral and guarantees concentration. Figure 1 shows the position of sector concentration risk within the overall framework of credit risk.

Competent authorities can use various measures and indicators to assess the level of concentration. The most common is the Herfindahl-Hirschman Index (HHI), which can be incorporated into more or less sophisticated methodologies to estimate the additional credit risk impact.

An Advanced Working Group (AWG) on Sectoral Risk has been established at the EBA to unify the approach to measuring sector concentrations at EU level. At its meeting at the end of January 2015, the AWG presented a proposal for a single approach to measuring sector concentrations. The final document will be submitted in April 2015. The solution involves the use of the HHI (section 4 of this article) and a model-based approach to determining capital requirements associated with sector concentrations (section 5).

3. SECTOR CREDIT CONCENTRATIONS ACCORDING TO THE CCR

Concentrations can be evaluated from either a systemic or granular perspective. From the financial stability/systemic perspective it is vital to focus on the risks to groups of banks arising from common business concentrations. From the internal risk management and supervisory perspective (the individual micro-perspective) the most important thing is to concentrate on risks at the individual institution level.

In this article we analyse sector concentration at both the systemic and granular level. The effect of sector concentration and its structure on economic capital requirements is documented using several portfolios. The benchmark portfolio reflects the sector concentration of the aggregate exposure to resident and non-resident legal entities, which report to the Central Credit Register (CCR). The model portfolios simulate characteristics of sector concentration in the banking sector.

In the interests of clear presentation of the analytical and modelling framework, we opted for sectoral breakdown at the level of the main industry sectors of the national economy. Industries with exposures of less than CZK 30 billion were pooled into the "Other" category. The part of the CCR credit portfolio for which no sector identification is available consists mainly of non-residents.

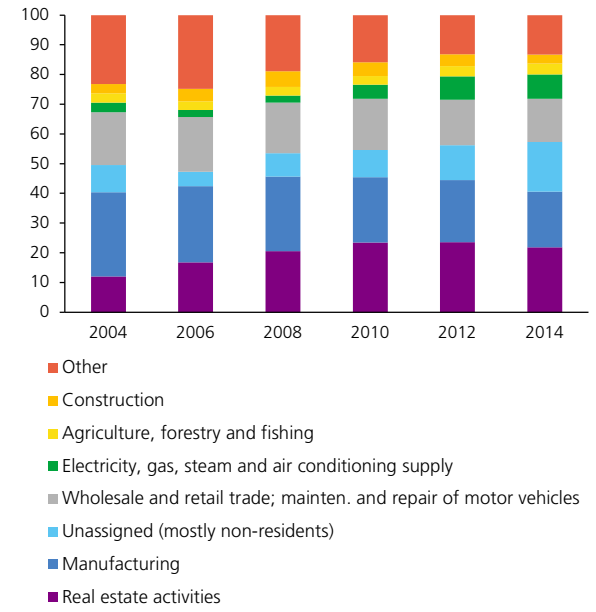
TABLE 1
SECTOR CONCENTRATIONS OF THE BENCHMARK PORTFOLIO
(CZK billions)

Sector	2004	2006	2008	2010	2012	2014
Real estate activities	77	131	192	210	233	254
Manufacturing	183	201	236	197	205	218
Of which: Manufacture of food products	25	24	29	23	23	19
Manufacture of metals and metal products	22	29	41	32	33	36
Manufacture of motor vehicles and other transport equipment	14	16	30	23	30	36
Manufacture of machinery and equipment	19	23	26	20	20	24
Other	103	109	110	99	99	103
Unassigned (mostly non-residents)	59	38	74	83	116	194
Wholesale and retail trade; maintenance and repair of motor vehicles	115	144	159	155	151	169
Electricity, gas, steam and air conditioning supply	21	19	23	43	77	96
Agriculture, forestry and fishing	20	22	27	26	35	42
Construction	20	33	49	42	39	36
Other	150	194	177	142	130	154
Total	645	783	937	898	985	1163

Source: CNB

CHART 1

SHARES OF SECTORS IN TOTAL CREDIT EXPOSURE
(shares in %)



Source: CNB

This segment is categorised as "Unassigned". The sector concentrations of the benchmark portfolio in 2004–2014 are presented in Table 1 and the shares of industries in the total credit exposure are shown in Chart 1. The data on the internal structure of manufacturing, the industry with the second-largest total exposure, reveal that no subsector is dominant (only four subsectors have shares exceeding 10% of the total exposure) and the dynamics of the exposures are little changed since 2008.

The dominant industries from the exposure structure perspective are "Real estate activities", "Manufacturing" and "Wholesale and retail trade; maintenance and repair of motor vehicles". The "Unassigned" category is dominated by loans to non-residents, which saw sharp growth between 2012 and 2014, mainly because of an expansion in the foreign activities of some banking groups. The most important change is that in the dominant industry from "Manufacturing" in 2004 (28% of the total exposure) to "Real estate activities" in 2014 with a share of 22% (versus 19% for "Manufacturing"). The changes signal a need for increased attention both in supervisory practice and in the design of macroprudential policy. Assessed in the context of change in the industries' contributions to production (Table 2), the relative shares of the main economic sectors have not altered significantly over time. This clearly reveals the potential risks.

TABLE 2

SHARES OF SECTORS IN PRODUCTION
(in %)

Sector	2004	2008	2013
Manufacturing	33	35	36
Wholesale and retail trade; maintenance and repair of motor vehicles	8	8	9
Construction	9	10	8
Real estate activities	6	6	7
Transport	6	6	6
Electricity, gas, steam and air conditioning supply	6	4	4
Agriculture, forestry and fishing	2	2	2
Other	30	29	28
Total	100	100	100

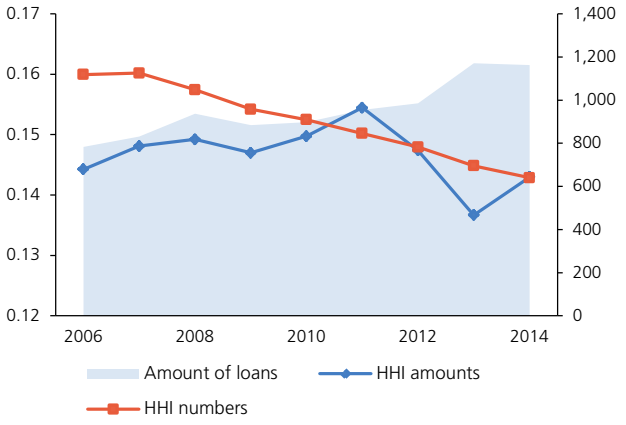
Source: CZSO

4. SECTOR CONCENTRATION AS MEASURED BY THE HHI

Use of the HHI is one of the recommended methods for evaluating sector concentration. This technique is a simple, non-model-based approach to determining undiversified idiosyncratic risk. The HHI is defined as the sum of the squared relative shares of borrowers' sectoral exposures in the total size of the portfolio. Well diversified portfolios containing a large number of small firms have HHIs close to zero, while highly concentrated portfolios have much higher HHIs. In the extreme case of a single borrower the HHI equals one. For the purposes of this article we determine the HHI at the total sector exposure level. The results reveal the significance of individual portfolios from the concentration risk perspective. However, they do not take into account borrowers' different probabilities of default,

CHART 2

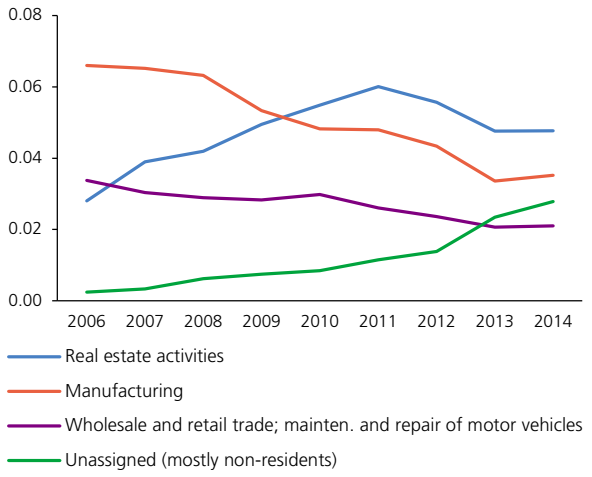
SIZE OF EXPOSURES AND THE HHI OF THE BENCHMARK PORTFOLIO
(index on left-hand scale; exposures in CZK billions on right-hand scale)



Source: CNB, authors' calculations

CHART 3

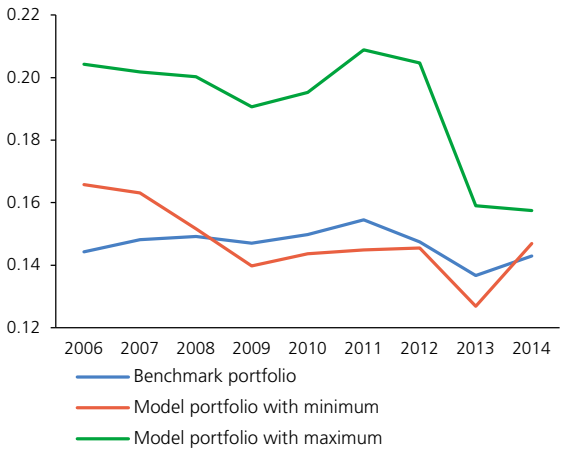
CONTRIBUTIONS OF THE MOST SIGNIFICANT SECTORS TO THE HHI
(index)



Source: CNB, authors' calculations

CHART 4

HHI FOR THE BENCHMARK PORTFOLIO AND THE MODEL PORTFOLIOS WITH MINIMUM AND MAXIMUM
(index)



Source: CNB, authors' calculations

collateral and inter-sector credit risk correlations and hence cannot provide information on the economic capital needed to cover risks.

At the system level, the HHI of the benchmark portfolio is 0.14 (see Chart 2, HHI amounts), i.e. a generally quite low concentration. The index varies over time within a range of 0.135 in 2013 and 0.155 in 2011, when it peaked in value. The sizeable decline in 2013 was caused by the incorporation of new exposures into the CCR linked with an expansion in foreign activities by some banking groups.

From the international perspective, the HHI takes similar values as in Germany (0.14 for regional banks and 0.17 for nationwide banks). However, the exposure share of "Real estate activities" differs, being around 15%[1] in Germany, i.e. 8 percentage points lower than in the Czech Republic (at the end of 2011).

The constant decline in the HHI as measured by the number of loans[2] in the period under review is due to higher sector diversification of new loans (regardless of amount).

The internal structure of the HHI from the sectoral perspective is shown in Chart 3, which depicts the change in the shares of industries in the total exposure. In 2010, "Real estate activities" became the sector with the largest exposure amid a steady decline in the weights of traditional industries. The significant growth in non-residents' exposures implies a need to pay increased attention to the risks associated with these exposures.

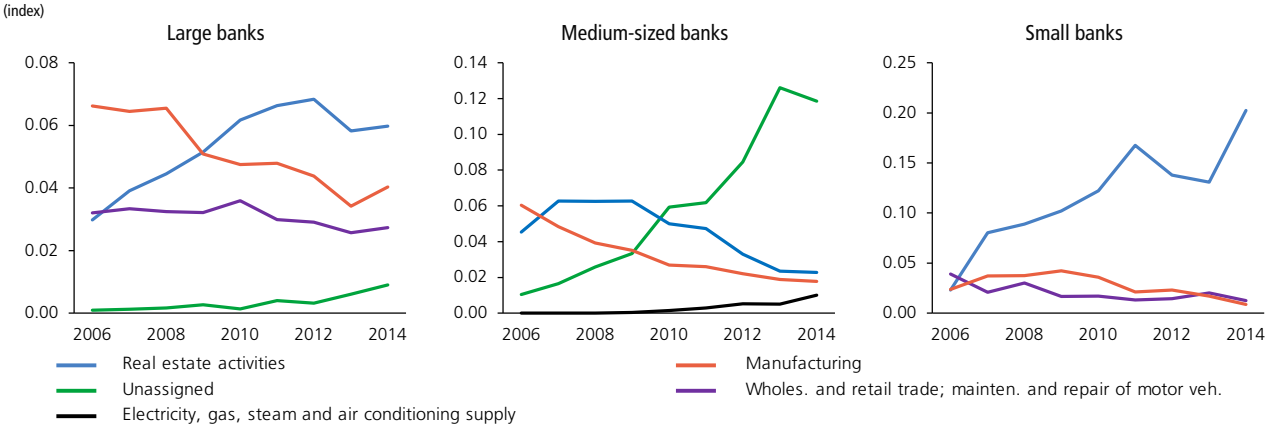
At a granular level, the HHI for the five largest banks fluctuates in a wide range of 0.13–0.21 (see Chart 4), signalling different approaches to the management of concentration risk and, for banks with higher HHIs, a need for more detailed analysis of all aspects of concentration risk. A positive tendency towards a decline in this measure of sector concentration and a narrowing of the range of the HHI can generally be observed since 2011.

The change in the key industry in terms of concentration from "Manufacturing" to "Real estate activities" is observed for all bank segments (large banks, medium-sized banks and small banks – see Chart 5). However, after peaking in 2011, the HHI for "Real estate activities" starts to decline. The only exception is the small bank segment, which saw a sharp rise in 2014, possibly indicating higher risk. Likewise, there was a significant increase in exposure to non-residents ("Unassigned") in the medium-sized bank segment, which, given its dominant position, is growing in significance. In this case, though, one needs to be more cautious in assessing the situation, because the non-resident sector may be relatively diversified from the sectoral and geographical perspective. The current growth in geopolitical risks of a regional character highlights the need for deeper analysis to determine the degree of risk. In the medium-sized bank segment, the "Electricity supply" industry has

1 Jahn et al. (2013), p. 7, industries 16 and 18 converted into a 100% share of the portfolio of enterprises.
2 The HHI as measured by the number of loans (HHI numbers) is defined as the sum of the squared relative shares of the numbers of loans of individual industries in the total number of loans.

CHART 5

CONTRIBUTIONS OF THE MAIN SECTORS TO THE HHI ACROSS BANK GROUPS
(index)



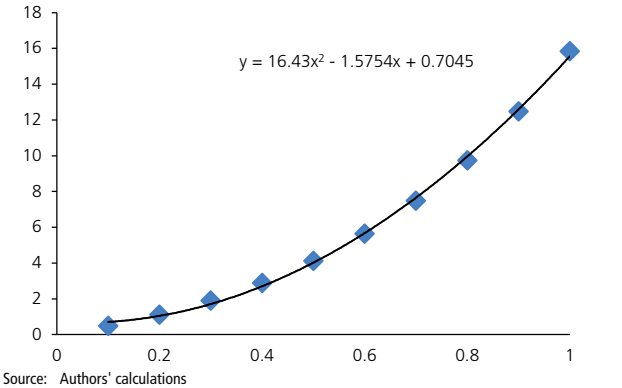
Source: CNB, authors' calculations

also been gaining in significance, partly due to the funding of photovoltaic power station construction. The risks in this area include long investment horizons, innovative technology and legislative and tax changes. Supervisors should therefore systematically evaluate the credit quality of this portfolio.

According to our HHI analysis of sector concentration, the aggregate values for the benchmark portfolio indicate relatively low concentration. One significant systemic structural shift is a change in the position of "Real estate activities", the industry with the largest exposure accompanied by a high level of concentration, especially in the small bank segment. In the medium-sized bank segment, sector concentration is rising significantly in the direction of non-residents ("Unassigned"). The dynamics and internal structure of this concentration therefore warrant increased attention.

CHART 6

SENSITIVITY OF ECONOMIC CAPITAL TO CHANGE IN THE SECTOR FACTOR WEIGHT
(x-axis: factor weight rs; y-axis: economic capital in %)



Source: Authors' calculations

5. USE OF THE FACTOR MODEL TO SET CAPITAL REQUIREMENTS FOR SECTOR CONCENTRATION RISK[3]

In this section, we complement the simple non-model-based approach to determining the level of undiversified idiosyncratic risk with a model-based approach that allows us to take sector concentration risk into account when setting economic capital.

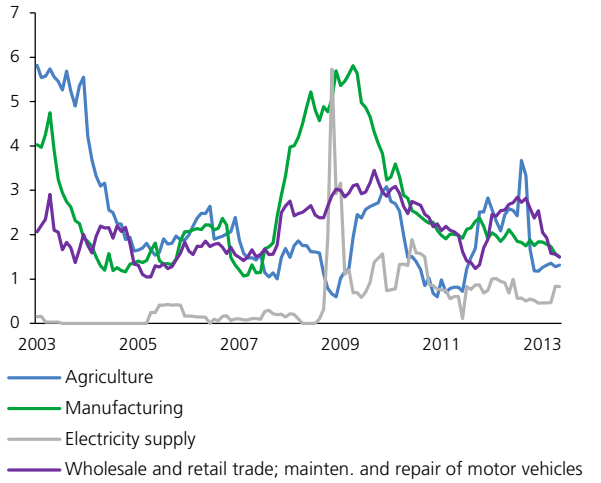
Sector concentration is a typical risk component of loans to non-financial corporations. The risk stems from dependencies arising between firms due to their sector affiliation and the prevailing economic environment.

The asymptomatic single risk factor (ASRF) model, which forms the basis for determining risk weights in the IRB approach, assumes that all loans are dependent on the same systemic risk factor. This ensures that economic capital can be determined individually for each and every loan without taking the portfolio structure into account. Given the assumed single correlation structure, the credit risk of a portfolio with a different sector structure may be either overestimated or underestimated. The risk contribution of sector concentration to the total portfolio risk can only be accounted for by extending the modelling framework.

3 Our calculations are based on the model presented in Düllmann and Masschelein (2007).

CHART 7

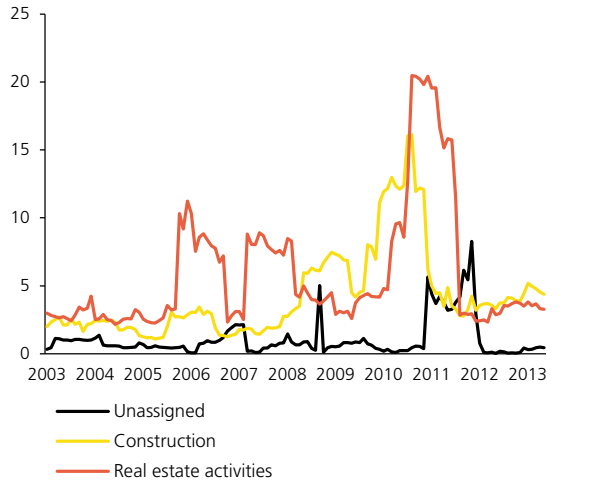
DEFAULT RATES BY SECTOR IN 2003–2013 (MAXIMUM < 6%)
(12-month default rate in %)



Source: CNB

CHART 8

DEFAULT RATES BY SECTOR IN 2003–2013 (MAXIMUM > 6%)
(12-month default rate in %)



Source: CNB

A key prerequisite for measuring sector concentration is the industry classification. The CCR data contain NACE industry code information for residents, and the breakdown into economic activities is based on that information. The industry definition allows individual risk factors to be assigned directly. The ideal industry classification is one where the intra-sectoral correlation of asset yields is high and the inter-sectoral correlation is low. However, this breakdown cannot be used in practice because the intra and inter-sectoral correlations are both heterogeneous. The intra-sectoral asset correlation is usually described by statistically calibrated functions such as non-financial corporation turnover, while the inter-sectoral correlation tends to be estimated, for example, by the time series of correlations of relevant stock indices.

As we do not have all the necessary information available, we use an intra-sectoral correlation of 0.25 as implied by the sector factor weight of 0.5 found in foreign empirical studies (Hahnenstein, 2004, and Lopez, 2004) and we replace the correlation of the relevant stock indices by the correlation of the year-on-year change in the sector's quarterly contribution to GDP growth. To assess the impact of this factor on the calculation results, we tested the sensitivity of economic capital to change in the sector factor weight. The results are shown in Chart 6, in which economic capital increases exponentially with increasing factor weight. From this perspective, we consider the value of 0.5 to be reasonable.

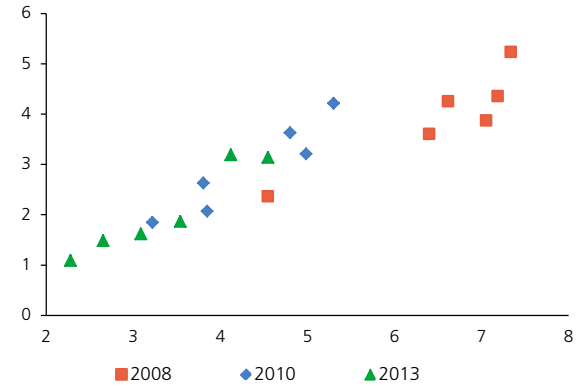
Another component of the model is the loan default rate for the relevant sector, which was calculated using CCR data (see the thematic article *Use of the Czech Central Credit Register for financial stability purposes* in this Report). Charts 7 and 8 plot the default rates over the period of 2004–2013. The charts clearly show the effect and aftermath of the economic crisis in 2008–2009, when the highest default rates were recorded in "Manufacturing", "Wholesale and retail trade" and "Electricity supply", and in 2010, when "Construction" and "Real estate activities" attained the highest default rates. The crisis can be seen fading away in 2011 and 2012, except in "Wholesale and retail trade", where we see renewed growth in the default rate. During the crisis, "Construction", "Manufacturing" and "Real estate activities" all recorded their highest ever absolute default rates.

The output of the model is the need for economic capital, which proxies for regulatory capital in the model context. The results show that the economic capital for credit risk inclusive of sector concentration risk of the benchmark portfolio (the aggregate CCR) and the model portfolios differs for different degrees of portfolio diversification depending on the level of risk of each sector (see Chart 9). The need for economic capital increases with increasing concentration in sectors with higher default rates and with general growth in the default rate.

The relationship between concentration as measured by the HHI and economic capital (see Chart 10) reveals that the difference in the capital requirements of the least and most concentrated portfolios in periods when the portfolio default rate is low (2010 and 2013) is roughly 2 percentage

CHART 9

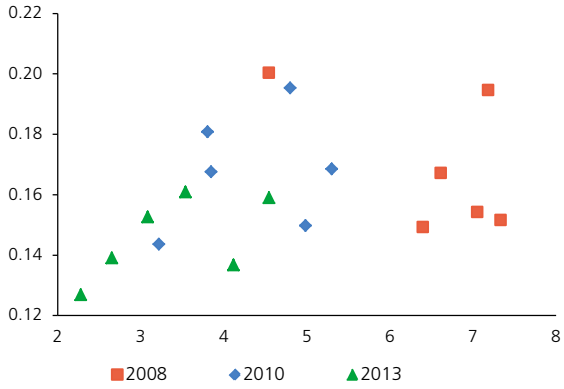
WEIGHTED PORTFOLIO DEFAULT RATES VERSUS ECONOMIC CAPITAL FOR THE BENCHMARK AND MODEL PORTFOLIOS
(x-axis: economic capital in %; y-axis: weighted portfolio default rate in %)



Source: CNB, authors' calculations

CHART 10

HHI VERSUS ECONOMIC CAPITAL FOR THE BENCHMARK AND MODEL PORTFOLIOS
(x-axis: economic capital in %; y-axis: HHI)



Source: CNB, authors' calculations

points, signalling a need for additional economic capital to cover sector concentration risk.

Although we observe some dependence between the level of concentration as measured by the HHI and economic capital, the results simultaneously show that the HHI cannot be used to proxy for the capital requirement, as it does not respond to the default rate in individual sectors. This can be seen in Chart 10 on the example of the low risk of a more concentrated portfolio (2008 top left) and the higher risk of a less concentrated portfolio (bottom right). However, the HHI may be a suitable auxiliary indicator of economic capital in periods when the default rate is generally low and not too different.

6. CONCLUSION

Concentration of credit risk in asset portfolios is one of the potential causes of large losses in credit institutions and one of the specific risks subject to supervisory review under Pillar 2. Large exposure risk is addressed in quite some detail in the CRR, but sector concentration is not subject to detailed regulation.

This article therefore presented a method for evaluating whether sector concentration, measured at the level of the main sectors of the national economy, indicates an additional need for capital under Pillar 2. We then measured the degree of concentration and its long-term tendencies using the HHI as a recommended simple non-model-based approach. We worked with information on the portfolio of loans to resident and non-resident legal entities taken from the Czech Central Credit Register (CCR), which we incorporated into a benchmark portfolio (the aggregate CCR exposure) and model portfolios (simulating characteristics of portfolios in the banking sector).

The factor model used for the indicative calculation of economic capital signals a need for higher economic capital for model portfolios with higher sector concentrations and riskier sector profiles (higher loss given default). The results of the model for 2013 indicate that the difference in the capital requirements of the least and most concentrated portfolios as measured by the HHI is 2 percentage points. In such cases, supervisors should evaluate whether sector concentration risk is correctly measured, assessed and incorporated into capital requirements in the bank's internal capital adequacy assessment process (ICAAP). The results of the model can be used as a guide for assessing the positions of individual banks and setting a consistent approach to defining the amount of capital required for this risk at the level of the banking sector as a whole.

The aggregate HHI value for the concentration of the benchmark portfolio (0.135–0.155) can be regarded as quite low and comparable with that for Germany. Its internal structure has seen a significant change in the form of long-term growth in the exposure of the "Real estate activities" sector, which has become dominant in the present decade. This change needs to be reflected both in supervisory practice (the assessment of capital requirements under Pillar 2) and in stress testing and the design of macroprudential tools. Growth in the exposure of borrowers unassigned to a sector (primarily non-residents) and the significant share of such borrowers in the segment of medium-sized banks also warrant attention.

We also assess the possibility of using the HHI for setting capital requirements. The HHI cannot be used directly because it does not take account of sector risk. However, it can be used as an auxiliary indicator, as under certain conditions a higher HHI indicates higher capital requirements.

The method described in this article for indicating additional capital requirements for sector concentration risk and measuring the level and evolution of concentrations based on the HHI can be used as an auxiliary tool for supervisory purposes and in the design of macroprudential measures until the unified methodology being prepared by the EBA's Advanced Working Group on Sectoral Risk becomes available. This methodology is planned to be submitted for discussion in April 2015.

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USE OF THE CZECH CENTRAL CREDIT REGISTER FOR FINANCIAL STABILITY PURPOSES

Tomáš Konečný, Miroslav Plašil, Marek Rusnák, Pavel Řežábek

This article contains basic information on the Czech Central Credit Register (CCR) and documents the use of the CCR for fulfilling the objective of financial stability. It describes in detail the construction of credit risk indicators produced by the CNB on both a routine and ad hoc basis in its macroprudential supervisory work. The article concludes by briefly describing the CNB's plans to collect granular credit information. The extension of data collection to information on mortgages and consumer credit provided to households is linked with current European initiatives to establish a cross-border credit database. Detailed data on this credit segment are needed for some macroprudential tools, such as the loan-to-value ratio.

1. INTRODUCTION

Credit registers are an important source of information on loans provided in the economy and play a key role in the assessment of the quality of financial institutions' loan portfolios. Such information is crucial for monitoring and managing credit risk at both the single-institution and whole-economy level. The need for a detailed knowledge of credit market developments has led to a surge in the number of credit registers administered by public and private institutions over the last decade (Djankov et al., 2007). Public and private registers can be seen as complementary to some extent, but perform rather different functions (Miller, 2003).

The establishment of such registers has been driven by the need for banks to exchange data on the credit commitments of loan applicants. Information sharing generally helps financial institutions to reduce the information asymmetry between prospective borrowers and lenders, which in turn enhances the quality of lending processes. The empirical literature shows that credit registers reduce adverse selection and improve the provision of credit (Pagano and Jappelli, 1993), reduce excessive lending by banks (Bennardo et al., 2009) and reduce lending to risky clients (Hertzberg et al., 2011). On the other side of the coin, access to credit register data promotes financial innovations and drives greater competition between banks, which ultimately means better credit conditions for potential clients (Dent, 2014; World Bank, 2013).

Besides the goal of eliminating information asymmetry between lenders and borrowers, individual loan data (primarily from public registers) are increasingly being applied in banking supervision and in the area of monetary and macroprudential policy. The credit market situation cannot be correctly assessed without analysis of the credit conditions. Credit register data are vital for monitoring credit risk and correctly configuring macroprudential tools. They play a central role in stress testing of banks and can also be used for other analyses – for example for breaking down credit growth into supply and demand factors (see, for example, Plašil et al., 2013). Finally, credit registers are an invaluable source of information for research work and academic publications.

The Central Credit Register (CCR) administered by the Czech National Bank is a key credit register in the Czech Republic. All banks and branches of foreign banks doing business in the Czech Republic are CCR participants. This article describes the main features of the CCR and its use in macroprudential analyses geared towards fulfilling the objective of financial stability. It also provides information on the current European AnaCredit initiative to establish a cross-border credit database. This initiative predetermines the CNB's future steps in the collection of loan data on a loan-by-loan basis.

2. COMPARISON OF THE CCR WITH OTHER CENTRAL CREDIT REGISTERS AROUND THE WORLD

The Czech Central Credit Register was created in line with international trends and is by no means unique. According to World Bank data (*Doing Business, Getting Credit*, June 2014) 91 countries currently have a public central credit register (in most cases run by the central bank) and 36 (including the Czech Republic) have both central and private registers. In the EU, 16 countries currently have a central register and a number of others (the Netherlands, Luxembourg, Greece, Finland, Estonia and Cyprus) plan to introduce one in the near future.

Central registers differ widely from country to country in the type and scope of information they contain. The main differences lie in the mandatory loan registration threshold, in the sector coverage of the credit market and in the nature of the data reported (either all loans or negative reporting of NPLs only). As far as thresholds are concerned,

TABLE 1

Main data fields available in MORIFIS

CATEGORY	FIELD
Bank details	Code of lending bank
	Type of bank (large, medium-sized, small)
Client details	Client identification information (replaced by anonymous code)
	Legal form
	Country of residence
	Institutional sector (ESA 95/ESA 2010)
	NACE category
	Workforce and turnover categories
Loan details	Loan identification information (replaced by anonymous code)
	Date of creation and maturity information
	Type and purpose
	Currency
	Sector classification
	Total amount
	Current amount outstanding
	Risk category
	Principal and interest past due
	Number of days past due
	Collateral type

Source: CNB

in some countries (including the Czech Republic) the register contains all loans regardless of amount, whereas in others the thresholds range from EUR 50 (Portugal) to EUR 1,500,000 (Germany). As for sector coverage, roughly 60% of registers collect data on all those concerned, while some countries (including the Czech Republic) limit themselves to data on only part of the credit market. The registers also differ in whether they record loans only, or loans plus off-balance-sheet items (such as in Austria).

When compared with other registers, the Czech CCR is fairly standard in terms of the above aspects. It is a large information system containing information on all bank loans provided to legal entities and individual entrepreneurs regardless of amount. The CCR database does not have information on mortgages and consumer credit. This can be seen as its main drawback from the supervisory perspective.[1] The main purpose of the CCR is to reduce risky claims in the Czech financial system by enabling CCR participants (i.e. banks) to exchange information effectively. As with similar projects in other countries, the central bank acts as guarantor and administrator of the system and is responsible for its further development. Basic information about the CCR is therefore also available on CNB website.[2]

Other credit commitments besides traditional loans and overdrafts are also subject to mandatory CCR registration. They include current account debit balances, undrawn lending arrangements and standby credits, and guarantees issued. The records are updated once a month, allowing supervisors to identify emerging risks in a timely manner.[3] Internal credit monitoring at the CNB is normally done outside the CCR database. The necessary records are transferred for analytical purposes to a separate module (independent of the CCR) called MORIFIS (MOnitoring RIsks to FInancial Stability). With rare exceptions,[4] MORIFIS contains identical information to the CCR. However, to ensure greater protection of personal data and reduce the likelihood of data being abused, the individual records are anonymised for standard users so that specific borrowers cannot be traced out.

Besides the identification data of the bank that registered the loan in the database, MORIFIS (like the CCR) contains detailed information on the borrower and selected loan characteristics (see Table 1 for details). Unlike most registers in the EU, there is no information on collateral value (France and Spain also do not collect this information). Other missing attributes include PD and LGD (see the Glossary) and interest rates, but other countries rarely collect such information either. The German, Austrian, Belgian, Irish and Romanian registers contain PD, while LGD is available only in the recently established Irish central register and interest rates are contained only in the Irish, Latvian and Slovenian registers. Although registers in some countries contain more characteristics than the CCR, the CCR database still offers enough scope for a wide range of credit risk analyses to be performed.

1 This is due mainly to historical factors, as this segment of the credit market was not so significant at the time the CCR was established. Basic information about such loans is currently contained in the Client Information Bank Register (CIBR) operated by a private company called Czech Banking Credit Bureau, a.s. Another register, which also contains information on loans from non-bank lenders, is SOLUS. The collection of mortgage and consumer credit data is covered in section 4 of this article.

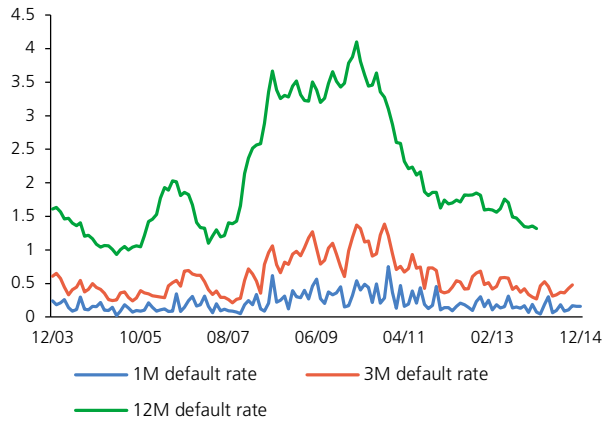
2 https://www.cnb.cz/en/supervision_financial_market/central_credit_register/cru_obsah.html.

3 Most registers in the EU update their data monthly. The exceptions are Germany (quarterly), Ireland (every six months) and Latvia (daily).

4 One difference is the time for which client histories are stored. Only a 10-year history of client debt liabilities is stored in the CCR, whereas all records are kept indefinitely in the MORIFIS module used for internal analyses.

CHART 1

Default rates on loans to non-financial corporations
(in %)



Source: CNB, authors' calculations

3. USE OF THE CCR FOR CREDIT RISK MONITORING

The CNB uses CCR data to produce a set of credit risk indicators on both a regular and ad hoc basis. This section presents selected indicators to demonstrate the CCR's breadth of application in the financial stability area. To save space, we focus on defining these indicators and deal only in passing with their economic interpretation.

The default rate and its use

The key indicator obtained from CCR data is the default rate, i.e. the proportion of good loans that will fall into default in the next few months (usually 3 months or 12 months).[5] It can therefore be viewed as an estimate of the probability of a sound loan falling into default in a future period of pre-defined length. A default event is defined (see CNB Decree No. 163/2014) as occurring either when it becomes likely that the borrower will not meet his or her commitments duly and on time without the lender resorting to collateral to satisfy the claim, or when at least one instalment (of an amount deemed significant by the lender) falls more than 90 days past due.[6] Banks themselves can use default rates to calibrate rating models in advanced credit risk methods (the IRB approach). The probability of default (PD) estimated in these advanced methods differs from the default rate in that it can also depend on macroeconomic variables and individual characteristics of the debtor (e.g. indicators from financial statements). However, the PD should equal the long-term average default rate for each rating grade.

Chart 1 presents the default rates on loans to non-financial corporations in the Czech Republic over the period 2003–2014. It is clear from the chart that credit risk increased during 2008 and remained elevated until the end of 2011. The 12-month default rates at the end of 2013 are close to all-time lows.

The default rate is a key risk indicator. It can be evaluated on its own, but is often inputted into other analyses. For example, it is an important input for regular macro stress tests of banks, where it is used to calculate credit losses and to estimate capital requirements for credit risk. CCR data can be used to calculate default rates for individual branches of activity, enabling specific PDs to be estimated for individual banks based on the NACE composition of their portfolios. CCR data also make it possible to conduct a variety of ad hoc analyses in stress testing exercises (such as concentration tests and tests of the sensitivity of credit risk to property development projects).

Credit standards indicator

The default rate can also be used for monitoring other forms of credit risk. For example, it enables more accurate assessment of the tightness of credit standards. At times of rising competition, banks can be pressured into relaxing their credit standards excessively. This can be reflected in their interest margins narrowing to a level that is insufficient to cover credit risk. A simple indicator relating the size of the margin to the expected future materialisation of credit risk can be used to get a general idea of the current credit conditions.

To construct this indicator, one first needs to transform the interest margin and default rate time series on the interval [0,1] such that the value of one corresponds to when the margin was lowest and the default rate was highest.[7] In both cases, this corresponds to the situation that is least favourable from the risk perspective. By contrast, the transformed series take the value of zero when the margin was historically highest and the default rate was lowest. The resulting indicator is defined as the sum of the transformed

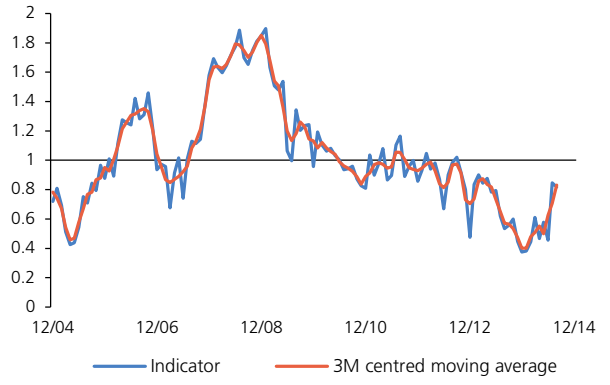
5 Alternatively, the default rate can be defined on the basis of the number of good loans that have fallen into default.

6 The default rate and the NPL ratio relate to the same event, i.e. to default. However, the default rate is a (usually forward-looking) flow indicator of the change occurring over a certain period of time, while the NPL ratio is a stock indicator of the amount of NPLs at a particular point in time.

7 Quantiles obtained by the kernel estimator for the cumulative distribution function were used for this purpose.

CHART 2

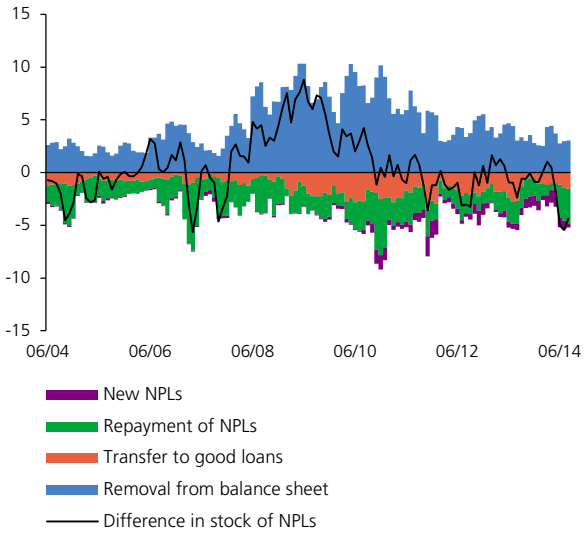
Indicator relating the size of interest margins to THE future materialisation of credit risk
(index, maximum = 2, minimum = 0)



Source: CNB, authors' calculations
Note: Interest margins are defined as the difference between interest rates on new loans to non-financial corporations and the 3M PRIBOR as a proxy for the risk-free interest rate.

CHART 3

Factors affecting the amount of non-performing loans
(CZK billions)



Source: CNB, authors' calculations

margin and default rate series and can therefore take values in the range of 0–2. Rising indicator values mean that margins are falling with no matching change in credit risk and/or that margins are not responding to the rising probability of future credit risk materialisation (alternatively, margins may be falling while the PD is rising). A resulting indicator value of around one corresponds to the situation where margins and the default rate were historically roughly in equilibrium (for example, where high margins were accompanied by a high default rate or where low margins were accompanied by a low default rate). The extreme values (2 and 0) indicate historically high and low risk respectively.

Chart 2 shows that there was a gradual relaxation of the interest rate component of the credit standards in relation to PD for non-financial corporations during 2014. Although the figures are still slightly below average in historical terms, the trend points to a need to start following credit standards more closely again

Breakdown of NPLs into the effects of individual factors

Besides the default rate, the most frequently used indicator of credit risk is the ratio of NPLs to total loans. However, developments in this stock indicator can be affected by various factors, making them difficult to interpret in terms of credit risk. Credit register data make it possible to analyse these factors in depth. The difference in the value of NPLs between two successive periods can be broken down into several factors, whose effect is given by following relationship:

$$S_t - S_{t-1} = DF_t - REP_t - NDF_t - O_t,$$

where S_t is the amount of NPLs at time t, DF_t is the inflow of loans newly categorised as NPLs, REP_t is the amount of NPLs being repaid, NDF_t is the value of loans moved from the NPL category back to the good loans category (a "negative" outflow) and O_t is the value of loans removed from the bank's balance sheet (i.e. sold off or written off).

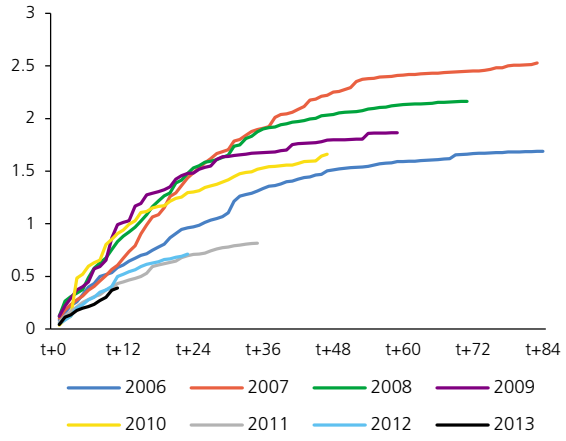
Chart 3 depicts the breakdown of NPLs into the individual factors. It can be seen that the high inflow of new loans into the NPL category lasted until roughly the end of 2011. The relatively favourable evolution of NPLs in the following period is due not only to a lower default rate, but also to the repayment of NPLs and the transfer of some loans from this category back to the good loans category (with both factors contributing in roughly equal measure). More frequent removal of NPLs from banks' balance sheets is also apparent in the post-crisis period.

Credit risk vintage analysis

Changes in the default rate in a set of loans provided in the same period (quarter, year) can signal a deterioration or improvement in the quality of recently provided loans. Vintage analysis partitions the loan portfolio by loan provision date and tracks the cumulative default rate. A steeper cumulative default rate curve indicates higher risk in the set of loans, while a less steep curve signals lower risk. A situation where loans provided in recent periods have

CHART 4

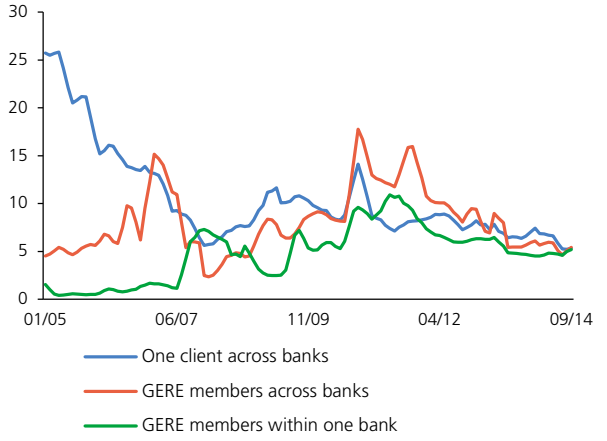
Credit risk vintage analysis
(cumulative default rate in %)



Source: CNB, authors' calculations

CHART 5

Value of loans at an increased risk of reclassification as NPLs
(standard loans; CZK billions)



Source: CNB, authors' calculations

steeper curves can indicate a worsening overall economic environment or excessive relaxation of credit standards. A deterioration in loan quality in recent periods can, for example, provide an additional reason for activating the countercyclical capital buffer.

Chart 4 shows the cumulative default rates for loans provided in the individual years of 2006–2013. Loans provided in 2007–2008 display the highest cumulative default rate. This indicates that at the peak of the credit boom, banks tend to lend to relatively risky clients, who are more vulnerable to a deterioration in economic conditions. Loans provided during the 2009 recession initially showed risk levels similar to those provided in 2008, but the recovery in 2010–2011 considerably limited further growth of these cumulative default rates. Loans provided in 2013 currently seem less risky than those provided in other years, as their risk curve is currently much flatter. This may be due to the macroeconomic recovery or to the low interest rate environment, which is making it easier for lenders to service their debt.

Differences in client risk classification across banks

CCR data can also be used to analyse the consistency of loan risk classification across banks. Within a single bank, a client who defaults on one loan will then have all his other loans with that bank classed as NPLs. However, the same may not apply across banks – a single client may have a different rating with one bank than with another. It is reasonable to assume that if a client defaults with one bank, its risk ratings with other banks will soon be affected. This, in turn, may cause credit risk to rise in the near future. Differences in risk classification and the evolution of those differences over time may also indicate how much the CCR is truly helping to eliminate information asymmetry through effective exchange of data between banks.

The CCR can also be used to measure how consistently loans are classified across groups of economically related entities. Such groups consist of firms that have close asset and/or economic links (for example strong client-supplier relationships). These strong links mean that repayment difficulties can soon spread from one member of the group to the rest. Consequently, if loans within the group have different risk ratings (either within one bank or across banks), some fraction of the good loans can be expected to become subject to an increased PD in the future.

Chart 5 plots standard loans provided to clients who have an NPL with another bank. The chart also depicts the value of good loans provided to members of a group of economically related entities, at least one of which has an NPL within a single bank or across banks. The observed values show that in the case of NPLs, the number of instances where loans to a single member are classed differently across banks (the blue line) has decreased significantly since the CCR was established. This indicator increased temporarily during and immediately after the financial crisis in line with the general rise in credit risk, but the current values are among the lowest ever recorded. Likewise, in the case of loans to members of a group of connected clients, the differences in risk classification within a single bank and across banks (the green and red lines in Chart 5) widened in the post-crisis period but have

subsequently gradually narrowed. The loans in the banking system at an increased risk of being reclassified as NPLs in the near future due to a higher probability of the borrowers concerned running into difficulties currently total CZK 16 billion (the sum of all three indicators). This is a very small figure in historical terms.

4. OTHER STEPS TAKEN BY THE CNB IN THE AREA OF INDIVIDUAL CREDIT DATA COLLECTION

The Czech banking sector has gone through some major changes since the CCR was created in 2002. Probably the biggest has been a surge in the popularity of mortgages and a resulting large increase in household indebtedness. Loans to private individuals now make up more than half of the bank credit portfolio and there is still room for further growth. The dynamic expansion of this credit segment has the potential to generate excessive risks to financial stability. If the probability of materialisation of these risks increases, they will need to be mitigated using macroprudential tools. However, such tools, especially in the area of property exposures (LTV, for example), cannot be applied without detailed data on loans to individuals, which the CCR lacks.

Another major change affecting the functioning of the banking sector has been the switch by some banks to the advanced approach to measuring credit risk. In this regard, it would seem useful to have information on internal bank parameters such as PD, LGD, the interest rate and collateral for individual loans, as such information could facilitate more effective supervision. Girault and Hwang (2010) put these parameters among the minimum set of attributes that a credit register should contain so it can best be used to strengthen the work of national supervisors and macroprudential authorities.

The CNB plans to obtain the aforementioned attributes together with detailed data on loans to private individuals under the recently launched European Analytical Credit Dataset (AnaCredit) initiative. The aim of AnaCredit is to collect harmonised information on loans and credit risk in the EU and to provide the information that the Eurosystem needs to perform its roles in the areas of monetary policy analyses and actions, financial stability risk monitoring and management, and supervision of credit institutions. According to preliminary information, the plan is to collect (among other things) granular credit data on loans to legal entities and individual borrowers with total exposures exceeding EUR 25,000 (with a reporting threshold of EUR 100 for loans with default). AnaCredit significantly expands both the coverage and number of attributes collected (to approximately 130 items). A European regulation on the collection of data in the AnaCredit database is expected to be issued during 2015, and actual data collection is expected to start in 2018 for legal entities and in mid-2020 for individuals.

The question remains as to what exactly the relationship will be between the information collected for the AnaCredit database and that collected for the original CCR. Several options are currently under consideration and the definitive proposed solution has not yet been worked out. The CCR, however, must continue to serve its main function of enabling banks to exchange information on the credit commitments of clients.

5. CONCLUSION

Besides enabling banks to exchange information on the credit histories of loan applicants, credit registers are an invaluable source of information for supervision and macroprudential policy. This article contains information on the content of the Central Credit Register administered by the Czech National Bank and documents the use of the CCR for monitoring risks to financial stability. Besides the default rate, it presents several additional analyses that give a more detailed picture of current tendencies in the credit market.

Although the CCR provides relevant information on credit risk, the system does not contain sufficient data for the macroprudential authority to be able to perform its duties. The CNB is therefore having to respond. New data requirements are arising mainly due to changes in the credit portfolio structure and the transition of key banks to the advanced approach to measuring credit risk.

The CNB plans to implement the collection of granular credit data under the AnaCredit initiative. The ambition of this initiative is to establish a cross-border credit database to collect harmonised information on loans and credit risk at EU level.

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COLLATERAL AND THE ROLE OF INTERNATIONAL MERCHANT BANKS IN THE SPREAD OF AGGREGATE RISKS

Alexis Derviz, Libor Holub

Non-financial corporations (NFCs) can use a whole range of instruments to collateralise bank loans. A form of systemic risk can arise in this context when the collateral consists of debt instruments issued by international merchant banks (outside collateral) and the assets of those banks simultaneously consist largely of shareholdings in the same set of NFCs. This situation, which is common in the Anglo-Saxon banking world, gives rise to a range of idiosyncratic risks for all the parties involved and also generates aggregate risk. In this article, we investigate the situation where an aggregate economic shock gives rise to increased NFC insolvency rates and where foreclosure on outside collateral by NFC creditors combined with a reduction in the value of shareholdings leads to impairment of merchant bank assets. Contagion risk arises and the sector becomes fragile (has a short distance to default) regardless of competition. This situation creates a high risk of official guarantees being issued for the liabilities of merchant banks. An alternative without the need for public sector involvement is to introduce simple bail-in principles for systemically important merchant banks by replacing debt instruments with contingent convertible debt. This approach is consistent with new regulatory tools requiring banks to hold, in addition to capital, types of liabilities that can be converted into capital when resolution plans are activated. The tools in question are MREL in the EU (defined in the Bank Recovery and Resolution Directive, BRRD) and TLAC in the USA. These regulations may also be useful for containing systemic risk in open economies serviced by big international banks outside host country regulatory control.

1. INTRODUCTION

The research described in this article[1] is concerned with two interconnected problems. The first is **risk concentration** in the global financial system, which is a surprising and unintended consequence of the efforts of borrowers and lenders to diversify their assets and liabilities as much as possible. And the second is **the vulnerability of the international merchant banking sector** as a key intermediary in the diversification process. We begin by describing the mechanism of formation of concentration risk.

Debt instruments as assets of non-financial corporations…

It is an empirical fact that non-financial corporations (and, in a sense, households as well, as far as mortgages and consumer credit are concerned) tend to hold cash and other liquid assets in excess of working capital and other assets immediately linked to their business.[2] Assets perceived as being safe, liquid and stable in value are naturally preferred. Debt instruments issued by big international financial institutions in the merchant banking sector are generally considered to satisfy these three criteria.[3] Growth in the deposits of non-financial corporations (NFCs) in the Czech Republic and around the world (see Chart 1) is leading to a search for higher yields, which some debt instruments can offer.

…are used as collateral instruments

When an NFC takes a loan, its activity-unrelated assets – including, in our case, debt instruments – usually become part of the collateral (we call them *outside collateral*).

The funds received by merchant banks are invested

The funds merchant banks receive from NFCs are only seemingly diversified in the investment process. Merchant banks ultimately have no choice other than to invest – even if through a chain formed of many links – in the same universe of NFCs whose contributions make up the liability side of the merchant banking sector balance sheet.

In the event of an aggregate shock coupled with a wave of NFC defaults, contagion occurs…

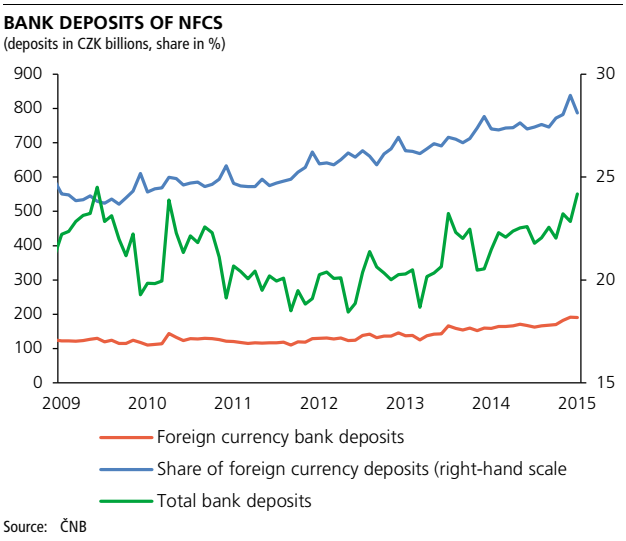
When an NFC becomes insolvent, the collateral is often sold either directly to its creditors or to the benefit of its creditors. If an aggregate shock hits a significant proportion

[1] A formal description of the model and a detailed discussion of its conclusions are given in Derviz (2014).

[2] This phenomenon was first investigated in literature drawing on data from the USA (Woodford, 1990). Analyses based on the European experience now exist as well (Bacchetta and Benhima, 2014).

[3] Investment banking in the narrower sense practically ceased to exist as a separate sector after the collapse of Lehman Brothers. However, the business these banks used to conduct is still carried on, albeit by differently organised entities. We will refer to them as merchant banks.

CHART 1



Source: ČNB

of NFCs in the economy, the amount of foreclosure on such collateral can be considerable. When outside collateral is sold, instruments which are otherwise unconnected with the debtor per se are exposed to selling pressure on the secondary market and the individual debt instruments securing NFCs' diversified exposures turn into a concentrated direct exposure to the final debtor – the merchant bank. The equity and debt securities issued by NFCs simultaneously fall in value. This reduces the value of merchant banks' assets and gives rise to contagion.

…and spreads to commercial banks

To finance their business activities, however, NFCs take loans from commercial banks. These loans are secured, among other things, by debt instruments issued by merchant banks (outside collateral). Such loans are exposed to both specific and aggregate default risks. The nature of the trilateral commercial bank-NFC-merchant bank relationship tends to be such that commercial banks hold claims with higher seniority (debt instruments) while merchant banks hold claims with lower seniority (equity instruments). What is more, the outside collateral used in the insolvency process is in our case made up largely of merchant bank debt instruments. In these circumstances, the consolidated merchant banking sector balance sheet is exposed to greater stress than the corporate sector balance sheet in the event of a negative shock to the real economy. As a result, the distance to default is also shorter for merchant banks than for NFCs.

The failure of a big merchant bank triggers a systemic liquidity crisis…

The main problem of default in the case of a big merchant bank is the associated shock wave of systemic illiquidity. In purely accounting terms, the merchant bank's loss resulting from an aggregate downturn in the production sector may be negligible. However, as every observer of a financial firm resolution knows, the process is lengthy, subject to arbitrary legal tangles, and with an uncertain completion horizon. In the meantime, all the debt instruments the merchant bank issued (and sold to agents demanding diversified outside collateral) is affected by a substantial illiquidity discount. This negatively affects the value of outside collateral, which has been acquired by more and more agents. Those agents move closer to default, and a vicious circle emerges in the financial and non-financial sectors simultaneously.[4]

…to which governments normally react by issuing guarantees for banks' liabilities…

Not surprisingly, therefore, many governments respond to the first signs of stress in systemically important financial institutions by resorting to some sort of guarantee for the commercial and merchant bank liabilities under their jurisdiction. This is what happened in the USA in 2008 and in several European countries, among them Ireland, in the autumn of the same year. Such a guarantee naturally represents a potential burden on public finances, so the price of maintaining liquidity in the financial system may be too high for a government with an already precarious sovereign debt position.

…thus giving rise to a need for a solution that does not burden public finances

There is therefore a need for alternative policies that will contain spates of illiquidity caused by default instead of shifting them from sector to sector around the economy like a hot potato.

A banking union has been established at EU level in response to the financial crisis. The union rests on three main pillars: (i) a single regulatory and supervisory mechanism, (ii) a single bank recovery and resolution mechanism and (iii) a deposit guarantee scheme. The key feature of the second pillar is that it involves certain categories of creditors in the recapitalisation process in order to increase banks' loss absorption capacity. This is

[4] There is an extensive literature on negative financial externalities and vicious circles, especially in the wake of the recent financial crisis (see, for example, Mendoza and Quadrini, 2010).

known as "bail-in". The bail-in rules define the general characteristics of debt instruments issued by banks which can be converted into capital in the event of bank distress, thereby turning creditors into shareholders ("eligible liabilities"). The European framework is known by the abbreviation MREL ("minimum requirements for own funds and eligible liabilities") and its US counterpart by TLAC ("total loss absorbing capacity").

The instruments that meet the definition of eligible liabilities include subordinated debt, long-term deposits of institutional investors and contingent convertible instruments. The interest returns on such instruments reflect their higher level of risk. Banks' liability structures meet the requirements to varying extents, but the vast majority of banks will have to boost their eligible or loss-absorbing liabilities. This provides an investment opportunity for well-capitalised, highly liquid non-bank institutions willing to take on the risks of such instruments.

2. WITHDRAWAL FROM OBLIGATIONS, BORROWER DEFAULT AND INTERMEDIARY DEFAULT

The first objective of the research described in this article is **to model the mechanisms whereby** the set of collateral referred to here as **outside collateral contributes to the accumulation of systemic risk in merchant banks**. The second objective is **to compare several alternative regulatory approaches from the perspective of the costs of combating systemic risk in the model environment**.

Our model of the mechanisms of the contribution of outside collateral to the creation of systemic risk…
If it is to serve the above purposes, the chosen model must incorporate the motivation of economically active agents to borrow. Otherwise, any problems associated first with taking a loan and then with servicing it would have the nature of an unsystematic deviation from rational behaviour, which in fact does not require any loans. We therefore consider a rational producer which, as a starting condition, has limited funds of its own, while the prevailing market input prices (wages and rental of necessary physical capital) point to a substantially higher optimal investment level. This implies a natural demand for more investor capital in the form of shareholdings or credit.

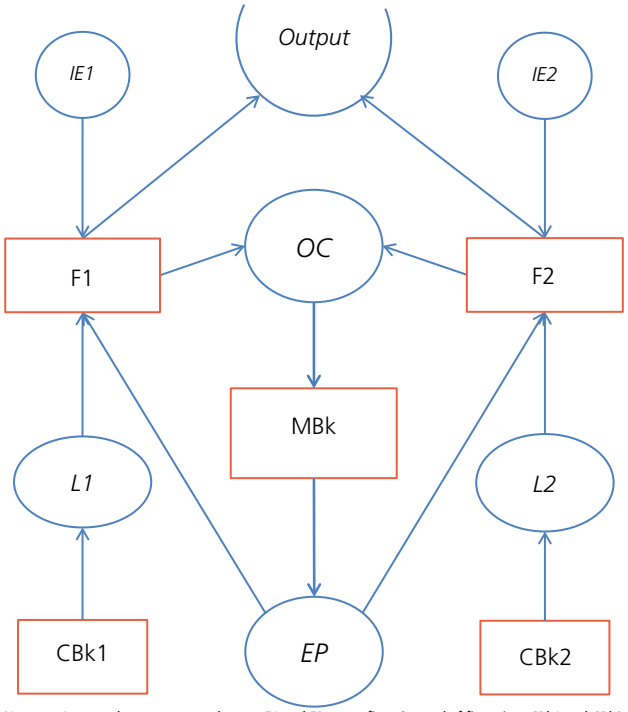
…uses the standard model of a production economy…
The standard model of a production economy with a Cobb-Douglas production function and parameter values (for the capital share, the labour share, consumer time preferences, the benchmark risk-free interest rate, etc.) gives rise to an equilibrium that assumes a non-zero NFC debt level. Thus far, however, the main features of this model are well known from standard microeconomics textbooks. The innovations in our model have to do with the choice of collateral for corporate debt.

The theoretical literature on loans at risk of default tends to identify loan collateral with the value of the NFC's assets, i.e. with the sum of the present value of output and physical capital at the end of the production cycle when the debt is repaid in part or in full. In the relevant models, a firm that is unable to repay must hand over its output and physical capital to its creditors, thereby partially satisfying their claims. Business practice, as we know, is rather different, as the debtor usually owns other assets in addition to those linked with its own productive activity. Even the assets we call outside collateral go to the creditors in the event of insolvency. We go one step further and ask what additional assets are used as collateral. To better formalise the relevant issues, we now define the set of agents represented in the model.

…but extends the standard set of agents to include secondary equity market investors…
The baseline model, depicted in Figure 1, features firm owners (incumbent controlling shareholders), firm managers, commercial banks lending to those firms and also big merchant banks purchasing shareholdings in firms and selling their liabilities to firms in the form of fixed-income certificates of deposit (CDs). The extended model additionally includes secondary equity market investors buying freely tradable shares in the above firms. We assume that there is a large number of firms and a limited number of both commercial and merchant banks. In the case of commercial banks we use this assumption because lenders, which enjoy some market power over borrowers, are also sensitive to information on borrowers' expected performance when it comes to setting interest rates. In the model, therefore, interest rates respond to firms' capital structure and productivity, in line with empirical evidence (see, for example, Chan and Kanatas, 1985, and Strahan and Cebenoyan, 2004). If, by contrast, the model – ignoring the real world evidence – assumed fully competitive behaviour of commercial banks (as is often assumed in the theoretical literature), the relevant properties of borrowers would not be sufficiently taken into account and would have no way of influencing the outcome. Furthermore, it is logical to assume that merchant banks are much larger than NFCs, given that we want to analyse the strategic shareholdings of those banks in firms. This contrasts with

FIGURE 1

STRUCTURE OF THE MODEL



Notes: Agents, shown as rectangles, are F1 and F2 – two firms in need of financing; CBk1 and CBk2 – commercial banks, lend to F1 and F2; MBk – merchant bank, sells its certificates of deposit to F1 and F2, buys strategic equity partnerships in F1 and F2.
Goods and assets, shown as ellipses, are Output, produced by F1 and F2; *L1* and *L2* – loans granted by commercial bank CBk1 to F1 and by CBk2 to F2; *IE1* and *IE2* – initial capital of F1 and F2; *EP* – equity partnerships in F1 and F2 acquired by the merchant bank; *OC* – outside collateral instruments (either officially guaranteed or convertible) purchased by F1 and F2 from MBk.

minor shareholders, who with their small shareholdings have no influence in decision-making.

…and adds the innovation of outside collateral…

Our model therefore contains one key innovation: the NFC's decision to buy assets in the form of merchant bank CDs and use them as collateral on a loan from a commercial bank. It finances this purchase by selling a sufficient number of new shares on the market, which are likewise bought by merchant banks. In the baseline setup the merchant bank balance sheet is simple, consisting of shareholdings in firms on the asset side and CDs on the liability side. The formal reason why firm shareholders decide to expand their set of investment opportunities in this way instead of investing more funds in the production process is that the existence of an intermediary in the shape of a merchant bank ultimately allows them to realise this expansion, albeit at the cost of transferring a fraction of their dividend income to other agents, but with a simultaneous reduction in the subjective default probability thanks to risk diversification. For the incumbent NFC shareholders, the resulting effect turns out to be positive (this issue is discussed further in the next section). The aggregate effect is additional leverage on top of that stemming from borrowing from commercial banks.

We should emphasise that the transaction framework described above is typical of highly developed and sophisticated financial markets containing well-capitalised, highly liquid NFCs. Use of this framework allows them to optimise their financial asset yields, financing costs and ownership structures. In the Czech case, this setup may open to criticism from the prudential perspective. However, we need to realise that large and economically strong financial and industrial conglomerates are being formed in the Central Europe region and that those conglomerates are able to use a similar transaction framework in the European economic area and create the kind of aggregate risks described above. In addition, general growth in bank deposits of NFCs in the Czech Republic (see Chart 1), coupled with insufficient investment opportunities in the real economy in the current low interest rate environment, may make new forms of investment more appealing to NFCs.

…which generates new elements when a contracting party defaults on a debt instrument

At the core of this modelling exercise is the definition of what happens in the event of withdrawal from a debt obligation. In the case of NFCs as debtors the mechanism is entirely standard and is equivalent to the procedure for limited liability companies: the firm surrenders its output, physical capital and outside collateral to the lending bank, and the shareholders get nothing. Merchant bank default is less easy to describe. Withdrawal from obligations for one merchant bank debt instrument logically triggers a shock wave of illiquidity across all other similar instruments. This affects all holders of debt instruments issued by the merchant bank, i.e. in our model all NFCs that use such instruments as outside collateral on their own debt. Among other things, this implies a fall in recovery rates across the economy. If this potential outcome is rationally foreseen, commercial banks should naturally respond by tightening their credit conditions, i.e. by increasing the "haircut" on outside collateral. This, however, can cause other NFCs unable to meet the tighter credit conditions to run into solvency problems. This gives rise to a vicious circle of insolvency well known from the recent global crisis and from its most significant predecessor, the Great Depression of the 1930s. The model uses a logical shortcut in that it defines merchant banks as a set of identical agents and describes only one representative of that set. Consequently,

it abstracts from the situation where merchant banks hold part of the debts of other merchant banks, which makes the merchant banking sector even more fragile. This implies that the crisis effects we describe here could be even more dramatic if we generalised the model to inhomogeneous, interconnected merchant banks.

3. INVESTMENT OF LIQUIDITY AND OUTSIDE COLLATERAL

The model we describe is a general equilibrium model, i.e. it assumes that several markets clear simultaneously. In this case we are concerned with the NFC credit market, the NFC equity market and the market for merchant bank CDs used as outside collateral. In the model, the supply of new shares and bank loans is endogenous, while changes in the supply of outside collateral form the basis for comparative-statics experiments. The reason for opting for exogeneity of the amount of eligible outside collateral is that although it is logical to enquire into the optimal amount of outside collateral, different agents turn out to have different interpretations of optimality.

The incentive to hold outside collateral varies across transaction agents…

For example, an NFC manager who is remunerated in proportion to the dividend paid but holds no sway over the level of equity (and thus takes it as given) has no interest in holding outside collateral. From his perspective, the introduction of outside collateral would lead primarily to higher debt levels and hence to a lower expected dividend, as liquidity is being invested elsewhere than in the project he manages. The optimal level of physical capital must therefore be financed additionally. Second-order effects such as a slightly lower default probability are not strong enough to reverse this negative preference.

…shareholders…

The NFC's controlling shareholders, by contrast, welcome the introduction of outside collateral, as they see a generally rising level of equity capital and less dependence on bank loans, and hence a lower default probability and a prospect of a lower loan interest rate. From the perspective of such shareholders, the expected dividend is conversely higher in the case of outside collateral.

…lending banks…

The opinion of the lending bank depends on whether its perception of reality is closer to the myopic view of the firm manager (with whom it negotiates the loan) or to the more sophisticated view of the NFC's owners. In the myopic case, the commercial bank can be expected to encourage the use of outside collateral, as it will boost loan demand and improve its bargaining position and will also increase the recovery rate in the event of default (as the value of the outside collateral is not tied to the performance of the NFC). By contrast, a bank with a broader macroeconomic view may not encourage the expansion of outside collateral so much if it is aware of the aggregate effect of a fall in interest rates and in the amount of debt service.

…regulators…

The regulator's view will also evidently depend on whether it pursues predominantly microprudential or macroprudential objectives. The microprudential perspective has much in common with the view of a commercial bank that adopts the firm manager's myopic view, as it puts the emphasis on the lower default probability and generally higher investment and output for a typical loan. By contrast, the macroprudential perspective must take into account the total loss given default at a time of negative aggregate shocks. With mass use of outside collateral, this loss is amplified by the spread of systemic risk across markets (the main theme of this article).

…and we therefore seek the natural level of outside collateral…

Given all that, it is difficult to clearly define the natural level of outside collateral for the general equilibrium calculation in this model. It is often necessary to compare the results for the full range of conceivable values. This is what we do in our research. We examine three particularly important benchmark levels: besides the zero initial level of outside collateral we seek, first, the endogenously determined optimal level of outside collateral from the perspective of the NFC's final majority shareholder (i.e. including the representative of the merchant bank that owns the equity share which the firm sold to finance the purchase of outside collateral) and, second, the maximum – and also endogenous – level of outside collateral in the case where the collateral is financed by the NFC's entire equity capital (original and new, as supplied by the merchant bank) and investment in production is financed solely by bank credit. We assume for simplicity that the NFC is not allowed to increase the level of outside collateral above the last-mentioned limit, i.e. it cannot part-finance it with bank credit.

Table 1 provides a qualitative overview of what happens to the general equilibrium in this model in the case of a permitted gradual expansion of outside collateral. To derive the optimal level of outside collateral from the public

TABLE 1

AGGREGATE EQUILIBRIUM IMPACT OF THE USE OF OUTSIDE COLLATERAL ON SELECTED MACROECONOMIC FUNDAMENTALS

Variable	Share of outside collateral in total NFC loan collateral	
	Rise to optimal level from firm shareholders' perspective	Further rise (to total equity capital level)
Lending rate	*moderate fall*	*slight fall*
Physical capital	*slight rise*	*slight fall*
Output	*slight rise*	*slight fall*
Total loans	*moderate rise*	*moderate fall*
Debt service	*moderate fall*	*moderate fall*
Dividends	*rise*	*moderate rise*
Probability of default, non-financial corporation	*fall*	*fall*
Probability of default, merchant bank	*fall*	*fall*
Merchant bank profit	*moderate fall*	*moderate rise*
Guarantees for merchant bank liabilities given default	*rise*	*sharp rise*

Source: ČNB

welfare perspective we would first need to define the relevant welfare function. We therefore leave this for future research.

…which significantly affects the merchant bank's solvency in the event of an aggregate shock…

A key question associated with the role of merchant banks as intermediaries between NFCs demanding high-quality collateral and other NFCs offering their shares on the market is how claims are settled when, due to an aggregate shock, the real sector is not earning enough and therefore paying low dividends. In this situation, a merchant bank that holds shares in firms is also not earning enough. It cannot reduce its fixed-income payments on CDs without declaring insolvency. A very important fact is that the merchant bank cannot set a low level of CD interest in advance in order to create a buffer for weak cash flow situations, because at low interest rates its CDs are not attractive to NFCs seeking alternative investments suitable for use as outside collateral. For this reason, in the model there is a floor for CD interest rates compatible with the existence of general equilibrium. As a result, even if it were a monopolist in its market, the merchant bank cannot fully exercise its market power and set interest rates low enough to protect itself adequately against the risk of low dividend income. It is more fragile than firms in the non-financial sector: there is a whole range of aggregate productivity values at which NFCs survive and repay their debts to commercial banks while merchant banks end up making a loss.

…and leads in the extreme case to outside collateral holders suffering losses if the government fails to issue guarantees

The question of who will bear the loss is linked with the legal status of merchant bank liabilities and has to be addressed outside the formal model described here. In the case of private owners of merchant bank debt instruments, the merchant bank must withdraw from all its obligations simultaneously in the event of default. This causes distress to all holders of its CDs (outside collateral), i.e. the entire non-financial sector in our model. A serious problem is that this happens regardless of the absolute size of the merchant bank loss. With the exception of extreme falls in aggregate productivity, a CD guarantee fund financed by corporate taxes would be able to cover this merchant bank loss. This is the model equivalent of what happened in many economies during the recent crisis, when governments issued guarantees for the liabilities of systemically important banks in the belief that any actual payments from the budget, i.e. from taxes, would amount to only a fraction of the formally guaranteed asset value.

The push to reduce official guarantees is giving rise to bail-in alternatives

However, even the potential burden on public finances was usually so large that it was necessary to consider bail-in alternatives, i.e. involving creditors in rescuing the bank. The most common bail-in mechanism involves the use of convertible, or contingent convertible, debt in the bank's balance sheet. "Contingent" means that conversion occurs only when predefined conditions linked with a deterioration in the financial institution's condition have been met. This approach now has a regulatory framework laid down in the EU Bank Recovery and Resolution Directive (BRRD, MREL) and in the TLAC instrument in the USA. The bank can of course hold convertible debt instruments in excess of the regulatory requirements, but may face a whole range of legal obstacles to converting them.

4. CONTINGENT CONVERTIBLE DEBT AS A WEAPON AGAINST SYSTEMIC RISK

Contingent convertible debt was discussed as a financial stability instrument long before the recent global crisis

TABLE 2

IMPACT ON SELECTED MACROECONOMIC FUNDAMENTALS OF THE CANCELLATION OF GUARANTEES AND THE TRANSFORMATION OF MERCHANT BANK LIABILITIES TO CONTINGENT CONVERTIBLE BONDS

Variable	Introduction of CoCo bonds instead of official guarantees
Lending rate	*moderate rise*
Physical capital	*slight fall*
Output	*slight fall*
Total loans	*slight fall*
Debt service	*slight fall*
Dividends	*slight fall*
Probability of default, non-financial corporation	*slight rise*
Probability of default, merchant bank	*eliminated*
Merchant bank profit	*moderate rise*
Guarantees for merchant bank liabilities given default	*eliminated*

Source: ČNB

flared up (see, for example, Flannery, 2005, and other references therein). Until recently, however, the emphasis in the literature was placed on containing moral hazard in banks: the threat of a decline in the price of convertible debt on the secondary market should deter banks' managers and controlling shareholders from engaging in excessively risky behaviour (Calomiris and Herring, 2012). Our research sets out to extend this view by incorporating channels of risk transmission in the event of negative aggregate shocks. In our model, therefore, there is a risk of failure of a systemically important financial intermediary and of related financial contagion regardless of whether or not moral hazard is present.

CoCos as an alternative to official guarantees…

A large number of proposed alternatives to official guarantees apply the concept of contingent capital or contingent convertible (CoCo) debt. In financial practice, CoCo bonds are converted into equity under predefined conditions tied to the issuer's accounts, the market value of selected assets of the issuer, a downgrading of the issuer's rating or a minimum level of capital. The simplicity of our model means that it is enough for these instruments to behave as standard bonds when the issuer is able to repay but to be converted into equity when it becomes insolvent. The research described here demonstrates how an economy might work if NFCs have diversified outside collateral in the form of merchant bank CoCos. For this purpose, we conduct experiments with the general equilibrium model described above in which a typical merchant bank has assets composed of shareholdings in NFCs and liabilities in the form of CoCos held by the same NFCs.

…change the behaviour of transaction agents and the values of macroeconomic fundamentals…

In the model, if the merchant bank's corporate dividend income is lower than the liabilities arising from its CDs, the CD owners are paid an aliquot share of the dividends of firms (which in this situation are understandably low) instead of fixed interest and principal. The loss arising in the NFC sector is thus dissolved in the sector itself and is not transferred to public budgets or to the investment and commercial banking sector. The key to determining the costs and benefits of this set-up is to work out how the agents' behaviour changes compared to the official guarantees case and how the values of macroeconomic fundamentals change in the new general equilibrium. We need to check whether leaving the additional risk in the private non-banking sector leads to an excessive fall in economic activity with knock-on effects on public welfare. Calculations conducted in our model indicate that the costs of this type are far smaller than the benefits in the form of elimination of the potential fiscal burden, which, moreover, would be payable when the economy is in recession.

…indicating a net benefit of using CoCos…

The impacts on individual economic fundamentals are summarised in Table 2, in which the benchmark aggregate level of outside collateral is the level that would be chosen by the NFCs' majority shareholders. The adverse effect on the usual macroeconomic aggregates (national income, investment, lending, interest rates etc.) of switching from official guarantees for merchant bank liabilities to a system of liabilities of the same banks operating in the CoCo regime turns out to be relatively small, even though the total amount of loans in the real economy is higher in the guarantee regime. In return, the exposure of public budgets to risks associated with guarantees in the event of adverse macroeconomic developments is completely eliminated. The effect is even stronger when one considers the amount of impaired assets whose CoCo guarantee may become payable even in the event of only a slight breach of the merchant banking sector's aggregate solvency threshold. In our model this comes out at around 50% of GDP.[5]

[5] This specific figure for payable guarantees stems from extreme simplification of many aspects of reality, most notably the commercial banking sector's balance sheet structure. It should therefore be treated with caution.

…and the prospect of development of the CoCo market

As banks are required to hold similar instruments for crisis resolution purposes (MREL and TLAC), a large CoCo market can be expected to develop. Given their relatively high rates of return, CoCos may also be a very attractive investment for NFCs with strong liquidity and capital positions. At the same time, however, they may give rise to a new kind of aggregate risk and probably also a different attitude of commercial banks to this type of outside collateral. This may lead to larger haircuts or conditional acceptance of collateral depending on the evolution of the indicator that activates conversion to capital. This type of risk needs further research and the model may have to be extended to include it in the future.

5. CONCLUSION

Two questions often arise in connection with the activity of merchant banks not only as issuers of liquid instruments used as outside collateral, but also as sources of additional financing for firms. The first relates directly to the construction of CoCos: Why not choose a more radical option and limit all permitted merchant bank liabilities to equity instruments, i.e. instruments that unconditionally link payments to investors to the institution's earnings?

According to current knowledge, the answer is no on both the purely practical level and the theoretical level. On the practical level, this solution would involve excessive administrative intervention in the operation of an entire significant sector of the economy, and such intervention would not be easy to justify on legal grounds. In addition, it would involve an attempt to drastically regulate international institutions that are capable of circumventing the restrictions of individual jurisdictions. Isolated economic considerations are not enough to justify imposing one specific market behaviour on a large number of significant economic agents. The costly state verification (CSV) literature (see Townsend, 1979) likewise tells us that such regulations would most probably go against the natural interests of both the owners of the institutions involved and their investment partners. The CSV theory demonstrates that when the issuer of liabilities has better information on its performance than the buyer, a debt instrument featuring contingent convertibility into capital if the issuer defaults is often the only contract that both parties are willing to accept. A classic equity contract is less advantageous for the buyer because the buyer must bear the costs of checking the true income of the issuer under all circumstances, whereas it pays the buyer to do so at most in cases where the issuer is insolvent.

The second question concerns the substitutability of the merchant banking sector by other institutions, for instance in the form of a standard equity market. Our model answers this question by allowing for generalisation in the shape of a secondary corporate equity market for small investors. Here, it turns out that in general equilibrium, small shareholders – who, in contrast to merchant banks acquiring large shareholdings, cannot see the influence of their stakes on the NFC's capital structure and behaviour – do not buy enough equities and do not pay enough for them to ensure optimal financing. This is a variation on the aforementioned theme of Townsend's CSV effect. Virtually all the performance parameters of a firm with a suboptimal capital structure are worse than those of a firm with a large owner capable of appreciating relevant changes in the marginal product of capital. The result indicates that an agent playing a role similar to that of the merchant bank in our model is in all probability the natural evolutionary outcome in a standard production economy. It therefore makes sense to analyse the impact of its activity on various aspects of the economy, including systemic risk.

We should stress that the use of contingent convertible bonds and similar instruments meeting the MREL and TLAC requirements on the liability side of the merchant bank balance sheet is not a miracle cure that will eradicate default and insolvency risk from the global financial system once and for all. This risk will not disappear. However, the vulnerability of merchant banks to aggregate risks associated with the use of original debt instruments as outside collateral by NFCs will be greatly reduced, and a significant channel of potential contagion to other market segments in the event of aggregate shocks will be closed.

The loss arising from weak performance of a systemically important group of economic agents will be allocated only subsequently to the results of those investors who, instead of investing directly in those agents, opted to deposit their funds with merchant banks with a vague idea of achieving greater diversification and lower risk. Those investments will ultimately resemble equities despite the investors' originally different intentions. However, such equity characteristics will only manifest themselves in situations where default has to be declared on fixed-income instruments. In all other (more favourable) scenarios, merchant bank liabilities retain a resemblance to bonds. The main financial stability benefit of contingent convertibility is that it limits the number of

cases where it is necessary to declare default on the fixed-income instrument.

However, the potential development of a large market in such instruments and of their use as outside collateral gives rise to a host of new aggregate risks in the event of economic shocks. These risks should be the subject of further research.

The advantages of the bail-in principles described in this article are perhaps most pronounced in small open economies, which cannot react very effectively on the regulatory level to investment decisions by international financial groups with large merchant banking operations. In the CoCo liability system, the government's role in the resolution of insolvent banks is transformed from that of provider of official guarantees to potential upholder of the shareholder rights of creditors from its own country in a going concern when the new owners are limited in exercising their shareholder rights. This is far simpler and cheaper than asserting creditor rights before a court in another country in the case of a bankrupt institution.

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GLOSSARY

Available solvency margin (ASM)

The adjusted level of own funds of an insurer or reinsurer.

Bank Lending Survey (BLS)

A survey of bank lending conditions for non-financial corporations and households in the Czech Republic, the pilot round of which took place in 2012 Q1. The survey aims to obtain qualitative information on current perceptions of the situation on both the supply and demand side of the credit market.

Balance-sheet liquidity The ability of an institution to meet its obligations in a corresponding volume and term structure.

Balance-sheet recession A situation caused by the efforts of market participants to reduce their debt, a resulting drop in demand for loans, and a limited ability to stimulate economic activity through monetary policy. The onset of a balance-sheet recession usually follows a sharp decline in asset prices, when the balance sheets of market participants can record negative equity, i.e. the value of assets is lower than that of balance-sheet liabilities. A typical example is the period following the bursting of the stock and property bubble in Japan during the 1990s.

Basel III A new regulatory framework issued by the Basel Committee on Banking Supervision in 2010 which sets standards for capital adequacy of banks and now also for their liquidity. Overall, Basel III introduces stricter rules than the previous framework and came into existence mainly as a reaction to the financial crisis.

Breakdown of banks by total assets

In some charts and tables in the FSR, banks are assigned to groups based on the amount of their total assets. The breakdown of banks into groups is revised at the end of each calendar year. In 2007 and 2008, banks having total assets of over CZK 150 billion were regarded as large banks, banks having total assets of over CZK 50 billion and up to CZK 150 billion were regarded as medium-sized banks and banks having total assets of less than CZK 50 billion were regarded as small banks. In 2009 the total amount of assets necessary for inclusion in the group of large banks was increased to CZK 200 billion and the range for medium-sized banks was changed to CZK 50 billion–CZK 200 billion. The range for small banks was unchanged. As from 2012, the breakdown of banks by total assets is as follows: large banks have total assets of over CZK 250 billion, medium-sized banks have total assets of over CZK 50 billion and up to CZK 250 billion and small banks have total assets of less than CZK 50 billion.

Capital ratio The ratio of regulatory capital to total risk-weighted assets. The Tier 1 capital ratio is the ratio of Tier 1 capital to total risk-weighted assets (see also Tier 1).

Capital requirement The capital requirement is the amount of capital a bank has to hold so as to cover all the risks it undertakes.

Collective investment funds (CIFs)

Mutual and investment funds whose sole business activity is collective investment, i.e. collecting funds from investors and investing them. CIFs are broken down by investor type into funds intended for the public (dominated by open-ended mutual funds) and funds

for qualified investors, and by asset risk into money market, bond, equity, mixed and real estate funds and funds of funds. Sometimes the category of funds of funds is not listed separately, but is included in the other categories according to the type of funds in which they invest.

Common Reporting Framework (COREP)

A common reporting framework in the EU, prepared by the European Banking Authority (EBA) for data reporting in accordance with prudential requirements (under CRR). It covers the areas of capital, capital adequacy, risk exposures, operational risk, market risk and credit risk.

Connectivity

An indicator of the degree of interconnectedness of a network element with the other elements (e.g. in a network of interbank exposures); for each bank, connectivity is calculated as the number of relationships with other banks divided by the maximum possible number of relationships and takes values from 0 to 100%. The average connectivity of the entire network is calculated as the average across all banks.

Czech Express Real Time Interbank Gross Settlement System (CERTIS)

A payment system processing all domestic interbank transfers in Czech koruna in real time.

Debt deflation

A situation where the real value of the debt of corporations and households rises as a result of falling prices and incomes. This happens primarily in a situation where the decrease in nominal interest rates is insufficient to offset the fall in the rate of growth of incomes.

Debt-service-to-income (DSTI)

The ratio of debt service to the net income of the loan applicant.

Default

Default is defined as a breach of the debtor's payment discipline. The debtor is in default at the moment when it is probable that he will not be able to repay his obligations in a proper and timely manner, without recourse by the creditor to settlement of the claim from the security, or when at least one repayment (the amount of which deemed by the creditor to be significant) is more than 90 days past due.

Default rate

The 12-month default rate is the ratio between the volume of liabilities of debtors which defaulted over a 12-month reference period and the volume of liabilities of all entities existing at the start of that period. The default rate can also be defined analogously in terms of the number of entities which defaulted over the reference period.

Deleveraging

A process consisting in the reduction of leverage, i.e. the reduction of indebtedness, which decreases the profitability of economic agents, but also the degree of risk associated with them.

Eligible collateral

An asset accepted to ensure fulfilment of an obligation to the central bank.

Financial Reporting Framework (FINREP)

A common reporting framework in the EU, prepared by the European Banking Authority (EBA) for data reporting in accordance with prudential requirements (under CRR). It covers the area of financial data of individual institutions, in particular the balance sheet and the profit and loss account.

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The CNB's main analytical model for creating medium-term forecasts. It is a dynamic structural model (DSGE) reflecting the main features of the Czech economy.

Gross government borrowing requirement
The net government borrowing requirement plus redemptions and repurchases of government bonds maturing in the given year, repayments of EIB loans, repurchases and exchanges of government bonds maturing in future years, and revaluation of funding reserves.

Herfindahl-Hirschman index (HHI)
The sum of the squares of the market shares of all entities operating on a given market. It expresses the level of concentration in the market. It takes values between 0 and 10,000. The lower the HHI, the less concentrated the market.

Household insolvency A situation where a household is unable to cover its current expenditures by its current income and the sale of its asset holdings. Insolvency is defined in legal terms in Act No. 182/2006 Coll., on Insolvency and Methods of Resolution Thereof.

Institutional investor Either (a) a bank executing trades in investment instruments on its own account on the capital market, an investment company, an investment fund, a pension fund or an insurance company, or (b) a foreign entity authorised to carry on business in the same fields in the Czech Republic as the entities listed under (a).

Interest rate spread Also interest rate differential; the spread between the interest rate on a contract (deposit, security) and a reference interest rate.

Interest rate transmission channel
One of the channels of the monetary policy transmission mechanism. It acts such that, for example, an increase (decrease) in monetary policy interest rates leads first to an increase (decrease) in interest rates on the interbank market. Consequently, there is an increase (decrease) in the interest rates announced by banks for the provision of loans and the acceptance of deposits. The result is a downturn (upturn) in investment activity as a part of aggregate demand and ultimately a decrease (increase) in inflation pressures.

Leverage See Leverage ratio.

Leverage ratio The new CRD IV/CRR rules define the leverage ratio as capital to risk-weighted assets. The term leverage is also often used in financial economics. There, however, capital is the denominator in the ratio (e.g. assets/capital or debt/capital). When we say that a bank has high leverage, we generally refer to the definition consistent with the assets/capital ratio. However, such a bank has a low leverage ratio.

Loan-to-income (LTI) The ratio of the amount of a loan to the net income of the loan applicant.

Loan-to-value (LTV) The ratio of the amount of a loan to the value of collateral.

Loss given default (LGD) The ratio of the loss on an exposure in the event of counterparty default to the amount owed at the time of default.

Macroprudential policy A key component of financial stability policy. It focuses on the stability of the financial system as a whole. Its main objective is to help prevent systemic risk.

Market liquidity The ability of market participants to carry out financial transactions in assets of a given volume without causing a pronounced change in their prices.

Marginal lending facility A facility enabling banks to borrow overnight liquidity from the CNB in repo operations. A bank is entitled to access the lending facility if it asks for the transaction to be made no later than 25 minutes prior to the end of the CERTIS accounting day. The minimum volume is CZK 10 million and amounts exceeding this threshold are provided without further restrictions. Funds provided under this facility are charged interest at the Lombard rate.

Mortgage refinancing The process whereby a mortgage debtor accepts a new loan from a different lender than the one from which he received the original loan and uses it to repay the original loan. He thus becomes a debtor of the other lender, but usually under more favourable conditions. This is usually possible only at the end of the original loan's fixation period.

Mortgage refixation The process whereby at the end of the fixation period of a mortgage loan the debtor selects the length of the new fixation period and negotiates new conditions for this period with the creditor. In this case, the identity of the creditor does not change.

Natural population increase The difference between the number of live births and the number of deaths in the same period of time in a given area.

Net financial assets The difference between the sum of financial assets and the sum of liabilities.

Non-performing loans A loan is non-performing if at least one of the following two situations occurs: a) the debtor is unlikely to pay its credit obligations in full without recourse to actions such as realising security, b) the debtor is past due more than 90 days on a credit obligation. For details, see Article 178 of Regulation (EU) No 575/2013 of the European Parliament and of the Council. Non-performing loans are broken down into substandard, doubtful and loss loans. Also called loans in default or default loans.

Pillar 1 The first part of the CRD directive, focused on the determination of minimum capital requirements for all credit institutions to cover credit, market and operational risks.

Pillar 2 The second part of the CRD directive, requiring credit institutions to assess whether the Pillar 1 capital requirement is sufficient to cover all the risks to which they are exposed. This assessment process is reviewed by the supervisory authority under the supervisory review and evaluation process (SREP). The supervisory authority then can apply a wide range of instruments, including setting an additional capital requirement, for example to cover concentration risk.

Prague InterBank Offered Rate (PRIBOR)
The reference interest rate on the interbank deposit market for deposit sales. Reference banks quoting the PRIBOR must be important participants in the interbank market.

Price-to-income (PTI) The ratio of the price of an apartment (68 m^2) to the sum of the annual wage in a given region over the last four quarters.

Price-to-rent (PR) The ratio of the price of an apartment to the annual rent. The price-to-rent ratio is the inverse of the rental return.

Property asking prices Property sale asking prices in estate agencies. Asking prices should be higher than transaction prices. Property asking prices in the Czech Republic are published, for example, by the CZSO and the Institute for Regional Information (which also publishes data on market rent supply prices).

Property developers/developments

Companies/projects whose aim is to build a complex of residential and commercial property. Property developers' work includes choosing an appropriate site, setting up a project, obtaining the necessary permits, building the necessary infrastructure, constructing the buildings and selling the property. Developers also often organise purchase financing for clients and frequently lease or manage the property once it is built (especially in the case of commercial property). Given the combination of construction activity and speculative property purchases, developers' results are strongly dependent on movements in property prices.

Property price gap The deviation of the price of property from its estimated equilibrium value.

Property transaction prices Prices of actual transactions on the property market, which should be the closest to actual market prices. The CZSO has been publishing two types of data on property transaction prices since 2011. Prices based on Ministry of Finance statistics from property transfer tax returns and published by the CZSO are the older source. These data contain time series from 1998 and are available in a relatively detailed breakdown (by region, degree of wear and tear and type of property). On the other hand, they do not include transactions which are not subject to property transfer tax (i.e. primarily transactions in new property) and the index is published with a lag of at least half a year. The second, new source of data on property transaction prices is data from CZSO surveys in estate agencies. They cover new property, but are not available in such a long time series and such a detailed breakdown.

Quantitative easing A method for implementing monetary policy in a situation where the central bank is no longer able to lower its monetary policy rate because it has already reduced it almost to zero. Quantitative easing involves the central bank buying assets from commercial banks and thereby creating a sizeable stock of free reserves with those banks. The purpose of this type of policy is to strengthen the balance-sheet and market liquidity of the banking system and minimise the risk of growth in interest rates due to insufficient liquidity. In the past ten years, quantitative easing has been applied in Japan and the USA. A similar policy is now being pursued, for example, by the ECB.

Rental return The ratio of the annual supply rent to the asking price of the apartment. It is the inverse of the price-to-rent ratio.

Required solvency margin (RSM)

The minimum level of the available solvency margin.

Return on equity (RoE) The ratio of net profit to equity of a firm.

Return on assets (RoA) The ratio of pre-tax profit and interest to total assets of a firm.

Risk premium The risk premium an investor demands on investments in riskier financial instruments.

Search for yield A situation where economic agents attempt to make up for generally low asset yields by seeking riskier-than-usual investments that yield a premium in return for the increased risk. Such behaviour may increase the future risks to the financial system.

Secondary market The market on which existing securities are traded.

Solvency Solvency in the insurance sector is the ability of an insurer to meet its insurance obligations, i.e. to settle eligible insurance claims arising from insured losses. Solvency II – a new

	regulatory framework prepared by the European Commission – is a set of rules for European insurance companies and reinsurers laying down quantitative requirements, qualitative requirements, prudential rules, compliance with market discipline and disclosure duties.
Solvency ratio	The ratio of the own funds of an insurance company to the minimum capital requirement necessary to cover all the risks it undertakes.
Sovereign risk	The risk that a government will default on its obligations, leading to national bankruptcy or restructuring of government debt.
Systemic risk	The risk of the entire financial system or market collapsing.
Technical interest rate	The interest rate used by insurance companies to calculate premiums in life insurance. The technical interest rate represents the increase in the value of life insurance provisions to which the customer is entitled under the policy (the guaranteed share in the returns on financial investment). The maximum technical interest rate is laid down in a decree.
Tier 1	The highest quality and, for banks in the Czech Republic, also the most significant part of regulatory capital. The dominant components of Tier 1 are equity capital, retained earnings and mandatory reserve funds.
Yield spread	Also yield differential; the spread between the yield on a bond and the yield on a reference ("benchmark") bond.

ABBREVIATIONS

AFS	available-for-sale (financial assets in the "available for sale" accounting category)
AQR	Asset Quality Review
AREMD	Association for Real Estate Market Development
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
bp	basis point
BRCI	Bank Register of Client Information operated by Czech Credit Banking Bureau
BRRD	Bank Recovery and Resolution Directive
BS	building society
CAR	capital adequacy ratio
CB	central bank
CCB	countercyclical capital buffer
CCR	Central Credit Register operated by the CNB
CERTIS	Czech Express Real Time Interbank Gross Settlement System
CET1	Common equity Tier 1
CMU	Capital Markets Union
CNB	Czech National Bank
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CZK	Czech koruna
CZSO	Czech Statistical Office
DSGE	Dynamic Stochastic General Equilibrium
DSTI	debt service-to-income
EA	euro area
EAD	exposure at default
EBA	European Banking Authority
EC	European Commission
ECB	European Central Bank
EEA	European Economic Area
EIB	European Investment Bank
ESA 95/2010	European System of Accounts
ESM	European Stability Mechanism
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)
FDI	foreign direct investment
Fed	Federal Reserve System
FRA	forward rate agreement
FSB	Financial Stability Board
FSR	Financial Stability Report
G20	group of the world's 20 largest economies
GB	government bond
GBP	pound sterling
GCPs	groups of connected persons
GDI	gross disposable income
GDP	gross domestic product

G-SIFI	global SIFI
G-SII	global systemically important institutions
HB index	Hypoteční banka property price index
HBS	Household Budget Statistics
HHI	Herfindahl-Hirschman index
HICP	Harmonised Index of Consumer Prices
HP	Hodrick-Prescott filter
IFRS	International Financial Reporting Standards
ILI	investment life insurance
ILO	International Labour Organisation
IMF	International Monetary Fund
IMF IFS	IMF International Financial Statistics
IRB	Internal Rating Based Approach, a Basel II bank capital adequacy approach
IRI	Institute for Regional Information
IRS	interest rate swap
ISR	sovereign risk indicator
KRW	Korean won
LAA	loss absorption amount
LCR	liquidity coverage ratio
LFS	Labour Force Survey
LGD	loss given default
LTI	loan-to-income
LTV	loan-to-value
MA	monthly adjusted
MF CR	Ministry of Finance of the Czech Republic
MFI	monetary financial institution
MiFID	Markets in Financial Instruments Directive
MLCX	Merrill Lynch Commodity Index
MoU	memorandum of understanding
MREL	minimum requirement for own funds and eligible liabilities
NACE	General Industrial Classification of Economic Activities
NiGEM	National Institute Global Econometric Model
NPL	non-performing loan
NSFR	net stable funding ratio
OECD	Organisation for Economic Cooperation and Development
OeNB	Österreichische Nationalbank (the Austrian central bank)
O-SII	other systemically important institution
OTC	over-the-counter (outside regulated markets)
p.a.	per annum
PD	probability of default
PMC	pension management company
pp	percentage point
PR	price-to-rent
PRIBOR	Prague InterBank Offered Rate (reference interest rate on the interbank market)
PTI	price-to-income
QE	quantitative easing
RCA	recapitalisation amount
RoA	return on assets
RoE	return on equity
RTS	regulatory technical standard
RUB	Russian rouble
RWA	risk-weighted assets

SA	standardised approach to credit risk
SCR	solvency capital requirement
SMEs	small and medium-sized enterprises
SRB	Systemic Risk Buffer
SREP	Supervisory Review and Evaluation Process
SRF	Single Resolution Fund
SRM	Single Resolution Mechanism
SSM	Single Supervisory Mechanism
TA	total assets
TIR	technical interest rate
TLAC	total loss-absorbing capacity
TLTRO	Targeted Longer-Term Refinancing Operations
USA	United States of America
USD	US dollar
VECM	Vector Error Correction Model
WGI	Worldwide Governance Indicators

COUNTRY ABBREVIATIONS

AT	Austria	IT	Italy
AU	Australia	JP	Japan
BE	Belgium	KO	Korea
BG	Bulgaria	LT	Lithuania
BR	Brazil	LU	Luxembourg
CA	Canada	LV	Latvia
CN	China	ME	Mexico
CY	Cyprus	MT	Malta
CZ	Czech Republic	NL	Netherlands
DE	Germany	NO	Norway
DK	Denmark	NZ	New Zealand
EE	Estonia	PL	Poland
ES	Spain	PT	Portugal
FI	Finland	RO	Romania
FR	France	RU	Russia
GR	Greece	SE	Sweden
HR	Croatia	SI	Slovenia
HU	Hungary	SK	Slovakia
CH	Switzerland	TR	Turkey
IE	Ireland	UK	United Kingdom
IN	India	US	United States
IS	Iceland		

FINANCIAL STABILITY INDICATORS – PART 1

		2009	2010	2011	2012	2013	2014	2015 Jan.	2015 Feb.	2015 Mar.	2015 Apr.
Macroeconomic environment											
ME.1	Real GDP growth (year on year, %)	-4.7	2.1	2.0	-0.7	-0.7	2.0				
ME.2	Consumer price inflation (average annual index growth, %)	1.5	1.5	1.9	3.3	1.4	0.4	0.1	0.1	0.2	0.5
ME.3	Public finance deficit / surplus / GDP (%)	-5.5	-4.4	-2.9	-4.0	-1.3	-1.2				
ME.4	Public debt / GDP (%)	34.1	38.2	41.0	45.5	45.7	43.9				
ME.5	Trade balance / GDP (%)	1.7	1.0	1.9	3.1	4.1	5.6				
ME.6	External debt in % of banking sector external assets	143.5	153.9	165.8	162.6	149.4	144.3				
ME.7	Balance of payments current account / GDP (%)	-2.3	-3.6	-2.1	-1.6	-0.5	0.6				
ME.8	Monetary policy 2W repo rate (end of period, %)	1.00	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Non-financial corporations*											
NC.1	Return on equity (%)	7.1	8.4	7.9	7.0	6.9	8.5				
NC.2	Debt (% of total liabilities)	49.3	50.3	51.3	53.1	55.0	54.7				
NC.3	Credit indebtedness (% of GDP)	37.5	37.3	37.3	37.7	37.8	36.7				
NC.4	– loans from Czech banks (% of GDP)	20.0	19.6	20.6	20.8	21.3	20.9				
NC.5	– loans from Czech non-bank financial corporations (% of GDP)	4.3	4.6	4.9	6.1	6.7	6.4				
NC.6	– other (including financing from abroad, % of GDP)	13.1	13.1	11.9	10.9	9.8	9.4				
NC.7	Interest coverage (pre-tax profit + interest paid/interest paid, %)	10.3	9.0	9.1	8.4	9.5	10.6				
NC.8	12M default rate (%)	4.0	4.3	3.0	1.9	1.9	1.6				
Households (including sole traders)											
H.1	Debt / gross disposable income (%)	50.5	51.4	54.2	55.5	58.0	58.1				
H.2	Debt / financial assets (%)	30.4	29.3	31.1	30.4	30.3	29.3				
H.3	Net financial assets (total financial assets – total liabilities, % of GDP)	61.9	65.6	62.5	67.5	70.1	77.0				
H.4	Debt / GDP (%)	28.7	28.8	29.8	31.0	32.3	32.5				
H.5	– loans from Czech banks to households (% of GDP)	23.2	24.3	25.0	26.1	27.5	28.2				
H.6	– loans from Czech non-bank fin. corporations to households (% of GDP)	2.9	1.6	1.7	1.7	1.7	1.7				
H.7	– loans from Czech banks to sole traders (% of GDP)	1.1	1.0	0.9	0.9	0.9	0.9				
H.8	– loans from Czech non-bank fin. corporations to sole traders (% of GDP)	0.4	0.4	0.3	0.3	0.2	0.2				
H.9	– other (including financing from abroad, % of GDP)	1.1	1.4	1.8	2.1	1.9	1.5				
H.10	Net interest expenses / gross disposable income (%)	1.5	1.9	1.9	1.9	1.9	1.8				
H.11	12M default rate (%, excluding sole traders)	5.1	5.0	4.4	3.9	3.6	3.7				
Financial markets											
FM.1	3M PRIBOR (average for period, %)	2.2	1.3	1.2	1.0	0.5	0.4	0.3	0.3	0.3	0.3
FM.2	1Y PRIBOR (average for period, %)	2.6	1.9	1.8	1.5	0.7	0.5	0.5	0.5	0.5	0.5
FM.3	10Y government bond yield (average for period, %)	4.8	3.9	3.7	2.8	2.1	1.6	0.4	0.4	0.4	0.3
FM.4	CZK / EUR exchange rate (average for period, %)	26.5	25.3	24.6	25.1	26.0	27.5	27.9	27.6	27.4	27.4
FM.5	Change in PX stock index (% year on year, end of period)	30.2	9.6	-25.6	14.0	-4.8	-4.3	1.0	7.0	1.1	-0.7
Property market											
PM.1	Total change in residential property prices	-8.0	-0.4	0.9	0.0	0.5	3,2**				
PM.2	Change in apartment prices (asking prices according to CZSO, % year on year)	-8.8	-3.1	-5.3	3.1	2.0	2.7			3.6	
PM.3	Apartment price / average annual wage	4.3	4.1	4.0	3.8	3.8	3.9				
PM.4	Apartment price / annual rent (according to IRI)	22.9	21.9	21.7	21.3	21.6	20.7			20.5	

* To maintain temporal consistency, the data for the debt indicators of non-financial corporations are still reported under the ESA 95 methodology. The most recent figures may thus differ from the currently published data, which are now compiled in accordance with ESA 2010.

** Estimate based on CZSO transaction prices and the HB Index for apartments, family houses and building plots (i.e. excluding apartment blocks)

Note: Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous FSRs.

FINANCIAL STABILITY INDICATORS – PART 2

		2009	2010	2011	2012	2013	2014	2015 Jan.	2015 Feb.	2015 Mar.	2015 Apr.
Financial sector											
FS.1	Financial sector assets / GDP (%)	133.9	135.9	142.3	148.0	160.5	160.0				
FS.2	Shares of individual segments in financial sector assets (%)										
FS.3	banks	77.2	77.4	78.1	77.2	78.1	77.8				
FS.4	credit unions	0.3	0.4	0.5	0.7	0.5	0.5				
FS.5	insurance companies	7.5	7.9	7.6	7.8	7.3	7.1				
FS.6	pension management companies and funds	4.1	4.3	4.3	4.6	4.7	4.9				
FS.7	investment funds*	2.8	3.1	2.9	3.6	3.8	4.3				
FS.8	non-bank financial corporations engaged in lending	7.6	6.5	6.2	5.8	5.3	5.2				
FS.9	investment firms	0.5	0.5	0.4	0.4	0.4	0.3				
Banking sector											
BS.1	Bank assets / GDP (%)	104.4	106.0	111.3	114.5	125.8	124.5				
BS.2	Assets structure (%, end of period)										
BS.3	loans to central bank	9.4	9.4	8.7	8.3	12.9	8.8				
BS.4	interbank loans	10.5	11.3	10.4	10.0	9.1	5.7				
BS.5	client loans	50.3	50.6	50.5	50.0	49.8	50.7				
BS.6	bond holdings	21.2	21.1	21.9	24.0	21.7	22.8				
BS.7	– government bonds	14.1	14.9	16.3	18.2	15.7	16.2				
BS.8	– Czech government bonds	12.8	13.8	15.1	16.8	14.5	14.8				
BS.9	other	8.7	7.5	8.4	7.7	6.5	12.1				
BS.10	Liabilities structure (%, end of period)										
BS.11	liabilities to central bank	0.1	0.0	0.1	0.2	0.0	0.1				
BS.12	interbank deposits	10.4	10.7	11.2	8.9	11.3	10.5				
BS.13	client deposits	66.6	67.3	65.9	68.3	67.2	66.9				
BS.14	bonds issued	8.8	8.4	8.4	8.0	8.3	8.6				
BS.15	other	14.1	13.5	14.4	14.5	13.1	13.9				
BS.16	Client loans / client deposits (%)	75.5	75.2	76.6	73.2	74.1	75.7				
BS.17	Sectoral breakdown of total loans (%)										
BS.18	non-financial corporations	37.2	35.9	35.9	35.4	34.5	33.2	33.2	33.4	33.3	
BS.19	households	42.7	44.2	43.8	44.3	43.4	43.3	43.2	43.3	43.3	
BS.20	sole traders	2.0	1.9	1.7	1.5	1.5	1.3	1.3	1.3	1.3	
BS.21	others (including non-residents)	18.0	18.1	18.6	18.8	20.6	22.1	22.2	22.0	22.0	
BS.22	Growth in loans (%, end of period, year on year):										
BS.23	total	1.3	3.5	6.0	2.4	6.5	4.8	4.7	5.2	5.3	
BS.24	non-financial corporations	-7.8	-0.3	6.1	0.9	3.8	0.9	0.8	2.2	3.0	
BS.25	– real estate activity (NACE L)	-5.9	6.0	11.5	0.7	6.3	3.7	2.8	3.0	4.8	
BS.26	households	11.1	7.0	5.0	3.6	4.5	4.5	4.7	4.7	4.9	
BS.27	– loans for house purchase	11.5	6.4	6.1	4.8	5.2	5.6	5.8	5.9	6.2	
BS.28	– consumer credit	9.8	7.3	-1.6	-0.7	0.4	-0.7	-0.6	-1.1	-1.1	
BS.29	sole traders	-1.4	-5.4	-5.5	-5.0	1.0	-4.0	-3.1	-2.8	-2.7	
BS.30	Non-performing loans / total loans (%):										
BS.31	total	5.2	6.2	6.0	6.0	5.9	6.0	6.0	6.0	6.1	
BS.32	non-financial corporations	7.9	9.0	8.2	7.4	7.1	6.6	6.6	6.5	6.4	
BS.33	households	3.8	5.0	4.9	5.1	5.0	4.7	4.7	4.7	4.6	
BS.34	– loans for house purchase	2.5	3.2	3.2	3.4	3.3	3.1	3.1	3.1	3.1	
BS.35	– consumer credit	8.4	11.7	11.3	12.3	12.2	12.1	12.2	12.1	11.8	
BS.36	sole traders	10.8	12.4	12.4	13.7	13.0	12.6	12.6	12.4	12.3	
BS.37	Coverage of non-performing loans by provisions (%)	50.1	46.8	49.0	49.5	51.6	52.6	52.6	52.0	50.7	
BS.38	Aggregate LTV for housing mortgages	56,4***	56.3	57.0	58.7	59.4	54.6				
BS.39	Capital ratio (%)	14.1	15.5	15.3	16.4	17.1	18.0				
BS.40	Tier 1 capital ratio (%)	12.3	13.9	13.9	15.7	16.5	17.5				
BS.41	Leverage (assets as a multiple of Tier 1)	15.5	14.4	14.3	13.7	13.1	12.4				
BS.42	Leverage ratio (approximation of Basel III definition, Tier 1 / exposures)	n.a.	n.a.	n.a.	n.a.	n.a.	7.2				
BS.43	Return on assets (%)	1.5	1.3	1.2	1.4	1.3	1.2	1.4	1.2	1.2	
BS.44	Return on Tier 1 (%)	27.0	22.5	19.8	21.8	18.6	16.8				
BS.45	Quick assets / total assets (%)	25.3	26.1	26.9	29.1	30.6	31.0	31.3	31.8	31.8	
BS.46	Quick assets / client deposits (%)	38.0	38.8	40.8	42.5	45.6	46.4	47.6	47.7	48.1	
BS.47	Net external position of banking sector (% of GDP)	4.9	4.6	3.9	6.3	3.3	1.7				
BS.48	Banking sector external debt / banking sector total assets (%)	11.8	11.9	12.2	10.0	13.5	15.7				

* Act No. 240/2013 Coll., on investment 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 take into account the effect of the one-off increase in NPLs in the portfolio of the Czech Export Bank in March 2014.
*** The definition of mortgages was changed in 2009.
Note: Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous FSRs.

FINANCIAL STABILITY INDICATORS – PART 3

		2009	2010	2011	2012	2013	2014	2015 Jan.	Feb.	Mar.	Apr.
Non-bank financial corporations											
NI.1	Share in financial sector assets (%)	22.0	21.8	21.1	21.7	21.0	21.5				
	Insurance companies*										
NI.2	Premiums written / GDP (%)	3.4	3.7	3.6	3.6	3.6	3.5				
NI.3	Solvency of insurance companies: life insurance (%)	295	354	302	313	308					
NI.4	Solvency of insurance companies: non-life insurance (%)	449	353	331	401	422					
NI.5	Change in financial investment of insurance companies (%)	6.1	3.5	1.6	5.2	1.9	3.2				
NI.6	Return on equity of insurance companies (%)	26.9	34.1	13.0	18.0	14.7	8.6				
NI.7	Claim settlement costs / net technical provisions (life, %)	15.1	14.8	16.3	16.9	18.2	20.6				
NI.8	Claim settlement costs / net technical provisions (non-life, %)	62.6	68.6	61.7	57.6	66.0	59.0				
	Pension management companies (PMCs) and PMC funds										
NI.9	Change in assets of funds managed by PMCs (%)	12.6	7.7	6.5	10.4	8.4	14.6				
NI.10	Nominal change in value of assets of PMC funds**	4.5	0.2	-0.6	5.3	-5.4	3.8				
	Investment funds										
NI.11	Growth in net assets (= equity; year on year, %)	-0.6	13.1	-3.4	17.2	19.8	19.3				
	Non-bank financial corporations engaged in lending										
NI.12	Growth in loans from non-bank financial corporations engaged in lending (%):***										
NI.13	total	-17.1	-12.4	1.5	-3.6	-4.1	2.9				
NI.14	households	-19.7	-41.9	6.5	-2.5	-2.3	4.1				
NI.15	non-financial corporations	-15.5	6.8	0.5	-3.1	-4.4	3.4				

* The indicators cover domestic insurance companies only.
** Change in the assets of pension funds adjusted for contributions and benefits.
*** The classification of loans provided by non-bank financial corporations engaged in lending was changed in 2010.
Note: Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous FSRs.

Issued by:
CZECH NATIONAL BANK
Na Příkopě 28
115 03 Praha 1
Czech Republic

Contact:
COMMUNICATIONS DIVISION
GENERAL SECRETARIAT
Tel.: +420 22441 3494
Fax.: +420 22441 2179

http://www.cnb.cz

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