FINANCIAL STABILITY REPORT

2012 / 2013

CNB CZECH NATIONAL BANK

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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) In accordance with its primary objective, the Czech National Bank shall

d) supervise the activities of entities operating on the financial market, analyse the evolution of the financial system, see to the sound operation and development of the financial market in the Czech Republic, and contribute to the stability of its financial system as a whole.

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. 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 not only to a strengthening of the importance of the objective of financial stability in central banks, but also to the institution of macroprudential policy designed to maintain financial stability. 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 every six months 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 ninth 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 the possible continuation of recession and the difficult situation in euro area countries.

The FSR is based on an advanced analytical and modelling framework and contains stress tests of the key segments of the financial sector (i.e. banks, insurance companies and pension funds) as well as a stress test of households. The testing methodology has gradually been refined and several changes have been made since the previous FSR. Calculation of individual banks' foreign exchange gains based on interest rates and credit portfolios has been added to the tests of the banking sector. The interbank contagion tests have also been revised and made tougher. The stress tests of insurance companies and pension funds make increasing use of individual data for individual tested institutions. The main refinement of the household stress test is modelling of the labour market position of households not only in relation to education level but also other socio-demographic variables. The household test now also incorporates shocks to interest rates.

The financial sector's resilience is tested by means of an alternative macroeconomic stress scenario entitled Protracted Depression. It assumes a long-lasting decline in economic activity caused by a sizeable fall in household consumption and investment in the domestic economy and low external demand. 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.

In an effort to gradually focus the FSR on macroprudential policy and its tools, some changes have been made to its structure. Like last year, the FSR is divided into four main sections followed by thematic articles. The *Real economy* section deals with the external and domestic macroeconomic environment and analyses the financial situation of non-financial corporations and households. The section entitled *Asset markets* analyses risks in the financial markets and the property market in more detail. The section called *The financial sector* describes key trends in the financial sector and the main sources of potential risks. The second part of this section newly includes stress tests of individual segments of the financial sector (banks, insurance companies and pension funds). The final section focuses mainly on an overall evaluation of the financial stability indicators and risks presented in the previous sections of the FSR and goes on to provide information on how macroprudential policy tools, microprudential regulation and financial market supervision can be used to respond to those risks.

The thematic articles react to selected topical financial stability issues. The article *An Additional Capital Requirement Based on the Domestic*

Systemic Importance of a Bank focuses on calculating the systemic importance of banks and quantifying additional capital buffers for individual banks in the Czech Republic. The article *Fiscal Sustainability and Financial Stability* discusses the two-way interaction between the financial sector and the government sector together with prudential policies aimed at reducing sovereign risk in financial institutions' balance sheets. The article *Household Stress Tests Using Microdata* presents a refined stress testing methodology and uses it to explore the impacts of macroeconomic scenarios on the percentage of distressed households by income. The article *Impacts of Housing Prices on the Financial Position of Households* analyses the effect of property prices on household consumption and debt in relation to housing type. The article *Modelling Bank Loans to Non-Financial Corporations* examines the effect of demand and supply factors on bank loans to non-financial corporations and presents a forecasting model for such loans.

This Financial Stability Report was approved by the CNB Bank Board at its regular meeting on financial stability issues on 23 May 2013 and was published on 18 June 2013. It is available in electronic form at http://www.cnb.cz/.

PART I

OVERALL ASSESSMENT

This summer the global economy will enter its seventh year since the crisis broke out. In Europe, however, the crisis cannot be said to be over yet, mainly because of developments in the euro area. Extreme financial market stress in late 2011 was dampened by a combination of ECB measures to provide massive amounts of long-term liquidity to banks. In summer 2012, however, the financial stability of the euro area was jeopardised again by a sharp rise in yields demanded on Spanish and Italian government bonds. It was again the ECB that calmed the situation, with its president promising to do anything to maintain the euro and being ready to make stabilising interventions on the government bond market where necessary. Although financial markets stabilised and liquidity was restored even on risky assets markets, the outlook for real economic activity worsened further. The situation therefore remains very strained, the current stability is very fragile, and a resurgence of strong tensions due to a combination of risks in bank balance sheets, falling economic activity and sovereign risk cannot be ruled out. The risks to financial stability in the euro area remain high.

The Czech financial sector remained highly resilient to external risks in 2012, with some of its parameters becoming even more robust. The return of the domestic economy to recession and the above-mentioned developments in the euro area pose a number of risks to future financial stability in the Czech Republic. The main risk scenario for the Czech economy over the next two years remains a sharp contraction of economic activity. The adverse income prospects of firms and households, related not only to falling external demand, but also to weak domestic demand, are generating potential for an increase in credit risk. So far this risk can be regarded as a short- to medium-term one. However, it cannot be ruled out that the European economy will face longer-term economic stagnation. In some countries this risk is arising as a result of macroeconomic imbalances and disruptions in the financial system stemming from the pre-crisis period. In other economies, including the Czech Republic, the indirect impacts of subdued growth in trading partner countries and structural obstacles to internal stimulation of economic activity predominate. This risk is being exacerbated by some European regulatory initiatives and certain elements of the banking union project.

DEVELOPMENTS IN 2012 AND 2013 Q1

Developments in both the global and Czech economy in 2012 were disappointing

The optimistic expectations of a recovery in advanced countries failed to materialise in 2012. The decline in euro area economic activity was also intensified by reduced availability of loans to the private sector in some countries. The German economy continued to grow, but also recorded signs of a slowdown in early 2013. In 2012 the Czech economy returned to recession, which still persists according to preliminary GDP data for 2013 Q1.

Monetary policies remained easy and major central banks are continuing their unconventional support measures

Given the absence of demand-pull inflation pressures, the world's major central banks kept their monetary policy rates at historically low levels.

In addition to standard instruments, they continued to pursue quantitative easing policies and introduced specific instruments to support the functioning of financial market segments and the real economy. Besides their indubitable stabilising effects, however, these policies may encourage excessive risk-taking in some financial market segments and have adverse cross-border consequences. A flattening of the yield curve and a related reduction in market opportunities led to a further decline in money market activity. CNB monetary policy rates have been at "technical zero" since November 2012. The situation on the Czech interbank market remained calm, as evidenced by zero take-up of the CNB's liquidity-providing repo operations.

The performance and financial position of the corporate sector deteriorated

The decline in economic activity had an adverse effect on the performance of the corporate sector, especially margins and profitability. This is true not only of construction and services, which had been under pressure from worsening financial conditions in previous years, but also of sectors which had previously been growing (including manufacturing), where negative signals are also beginning to emerge. The economy's high sensitivity to demand in the automotive industry, which is strongly affected by the business cycle in the EU, appears to be risky. The evolution of corporate credit risk was relatively favourable in 2012, with the NPL ratio recording a further decline, although some leading indicators point at renewed growth and slight signals of forbearance can even be observed. However, the total debt of the corporate sector is stable over time and seems sustainable, thanks among other things to lower interest expenses.

The worsened income situation of households has affected credit risk only slightly so far, but low-income households have become very vulnerable

In 2012 the household sector faced a worse situation primarily on the labour market, where the unemployment rate rose, the number of vacancies decreased and real wages declined. The NPL ratio in the household sector stabilised, partly because of falling interest rates. The exception was the consumer credit segment. However, the impacts on total credit risk are limited owing to the relatively low and falling share of this type of credit in total loans in the private sector. The financial situation of young households in and around Prague and Brno, which have the largest amount of loans, will be crucial to the further evolution of credit risk. Stress tests of the household sector indicate substantially higher vulnerability and a rising degree of overindebtedness among low-income households in all the tested scenarios.

Property prices and the number of property transactions continued to fall

The downward trend in residential property prices recorded in previous years continued into 2012. The decreases were in line with the trend in the real economy. The decline in prices was accompanied by a fall in the number and volume of property transactions. The commercial property segment did not record any improvement either. At the same time, indicators of residential property price sustainability improved, indicating, together with other estimates, that prices are most likely close to their fundamental levels. However, regional differences in the evolution of prices and the number of transactions are apparent within the overall downward trend in activity on the Czech property market, with Prague recording more moderate declines than the rest of the Czech Republic, or even slight increases.

Financial sector developments in 2012 were positive despite the unfavourable economic situation…

Developments in 2012 were positive from the perspective of the Czech financial sector, but annual growth in its total assets slowed owing to the decline in economic activity. The banking sector recorded increases in capital adequacy, profitability and household client deposits, with small banks recording the largest absolute increases given the higher average interest rates offered by these banks. The situation regarding the links between Czech banks and their parent groups has been generally favourable in recent months and the total exposures of domestic banks to their parent groups have shrunk, partly due to a change in the regulatory limits set by the CNB.

… almost all segments of the financial market recorded a rise in assets, but the credit union segment remains highly risky

Despite its riskier profile, the credit union segment also recorded a rise in customer numbers accompanied by a significant rise in total assets. Building societies saw a continued decrease in market share in loans for house purchase, primarily due to higher price competitiveness of loans for house purchase provided by banks. Insurance companies continue to show solid capitalisation and profitability. The pension fund sector has been affected by changes related to the pension reform but remains highly stable. Following previous losses, collective investment funds posted profits in 2012, while non-bank financial corporations engaged in lending recorded a slight decrease in loans provided, but also a slight decrease in credit risk.

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

The composition of external risks is unchanged, but the view of their relative importance has shifted: risks connected with the decline in economic activity have come to the fore

A high degree of uncertainty about further developments in the real economy, especially the horizon of a return to economic growth, persists in advanced countries and especially in the euro area. Consequently, the situation in spring 2013 is much the same as it was year ago. However, the perception of the importance of individual risks has partly changed. Risks linked with weak economic activity are being stressed more. By contrast, the perception of the importance of sovereign risk has diminished and a need to slow or even postpone fiscal consolidation is beginning to be accepted. At the same time, concerns about euro area banks' balance sheets and resilience to existing risks are increasing. Distrust of reported asset quality is deepening here, doubts surrounding the sufficiency of provisioning against non-performing loans are increasing and concerns about systematic forbearance are rising. These concerns are being reflected in calls for strict stress tests and coordinated asset quality reviews and subsequent recapitalisation or restructuring of banks that fail the tests and reviews.

High private sector and government debt in advanced countries is preventing a renewal of investor and consumer confidence

Slow progress is being made in reducing the imbalances that arose in many European countries before the crisis broke out. The rate and manner of correction of these imbalances differs significantly from country to country. Some countries are still characterised by high private sector debt, which is preventing a renewal of investor and consumer confidence. In some cases this is being exacerbated by rising public sector debt, which the countries concerned are failing to halt, let alone reduce, amid subdued economic growth. If the refinancing needs of the highly indebted states start to increase again, concerns about the impacts of

sovereign risk could resurface and a general rise in interest rates could prevent a return to economic growth.

The Czech economy will remain in recession in 2013, and recovery in 2014 is uncertain

The CNB's May forecast expects a further moderate fall in real GDP of 0.5% this year, but a relatively robust recovery is predicted for 2014, with GDP rising by 1.8%. Given the recent developments in the euro area, however, the risk that the Czech economy will stay in recession for longer must be taken into account. The difficult labour market situation and pessimistic expectations of the private sector will be obstacles to a faster recovery in domestic demand in the near future.

The probability of a balance-sheet recession remains very low

Some advanced countries are showing signs of a balance-sheet recession stemming from an increase supply of savings for which there is insufficient demand. In the Czech Republic, the potential for a balance-sheet recession is arising in the household sector, which has considerably increased its financial surpluses. However, these surpluses are for now being used by the corporate and especially the government sector. The relatively favourable evolution of the credit conditions, especially their interest rate component, also speaks against the materialisation of this scenario.

Rising budget deficit financing from abroad leading to growth in net external government debt could become a risk to Czech public finance

The external balance of the Czech Republic developed quite well in 2012. The exception was net external government debt, which followed an upward trend for the fourth consecutive year. Although both the level and speed of increase of government debt in the Czech Republic are currently favourable by comparison with advanced European countries, efforts to raise much more funds in the future to finance government debt on foreign markets could become a risk to financial stability.

Shortening mortgage rate fixation periods are making households more sensitive to the interest rate environment

As regards loans for house purchase, the share of mortgage loans with short rate fixation periods increased last year as a result of very low short-term interest rates. This is making households more sensitive to the interest rate conditions. However, it should not turn into a significant risk, as it implies a fall in mortgage loan servicing costs. As long as the rise in interest rates is gradual, banks and their customers should have time to adjust to the new situation. Growth in interest rates would pose a significant risk only if short refixation periods or floating rates were used mostly by low-income households.

The risks to property prices remain tilted to the downside

In the residential property sector, given the outlook for the real economy and demographic factors, apartment prices are expected to be flat or falling slightly in the near future. Prices could start to rise again in mid-2014. However, the risks to property prices are sizeable and are tilted towards lower price growth. A widening difference between the rental return and interest rates on house purchase loans is opening up the possibility of property purchases as financial investment. If this occurs on a large scale, prices in some regions could become overvalued in the medium term. Such overvaluation could even take the form of a bubble "from below", with property prices rising at a modest pace but their fundamentals (labour market stance, demographic developments, etc.) worsening at the same time and prices therefore becoming unsustainable in the long term.

The focus of financial investors on quality and liquidity is generating a risk of fundamental overvaluation of some government and corporate bonds

Flight-to-quality and flight-to-liquidity effects can emerge in bond markets at times of financial market stress. As a result, prices of high-quality government and corporate bonds can record excessive upward deviations. Besides market losses, a jump in long-term interest rates could cause a wave of sell-offs and a market liquidity crisis.

The main risk to the banking sector is a continuing recession leading to a substantial drop in profitability

The main risks to the banking sector stem from the continuing economic slowdown leading to higher credit losses and a considerable decline in banking sector profitability. The stable sources of profit – especially interest profit and profit from fees and commissions – are recording a year-on-year (albeit slight) decline for the first time since the start of the crisis, and this trend can be expected to continue in the years ahead. The *Baseline Scenario* expects interest profit to decline further by around 5% year on year over the scenario horizon.

Credit risk stabilised during 2012, but the outlook is not very optimistic

A significant deterioration in the credit portfolio resulting from adverse developments in the real economy remains a risk to the Czech banking sector. Credit risk in banks' balance-sheets, as expressed by the ratio of non-performing loans (NPLs) to total loans to residents, continued to follow the gradual downward trend of the last two years in 2012. However, the adverse outlook for the income situation of households and corporations is generating potential for a renewed rise. It can be deduced from the growth in NPLs and the related provisioning that the inflow of new NPLs has accelerated slightly in the last two quarters, and this trend can be expected to continue.

The coverage of NPLs by provisions may not be fully in line with the growth in credit risk in banks' balance sheets

Other complementary indicators also suggest a rise in credit risk. Within NPLs, the share of loans that are not actually past due is decreasing and the share of loans that are more than three months past due is continuing to rise. The migration of NPLs to the highest-risk category – loss loans – will continue in the period ahead. Moreover, the collateralisation of loss loans is falling slightly over time. The current coverage of NPLs by provisions, which has been almost unchanged in recent years and may therefore not be fully consistent with the evolution of bank loan risk described above, may also pose a risk. In addition, there are substantial differences between banks in the prudence of NPL coverage. The current credit margins for some types of loans may also not be consistent with appropriate credit risk valuation.

The impacts of credit risk could increase non-linearly as the recession lengthens

If the recession continues or even deepens, the balance sheets of Czech banks may become more sensitive to changes in the income situation of corporations and households. This could be reflected in a rapid non-linear increase in the default rate and losses given default. While the *Baseline Scenario* predicts a slight rise in credit risk, the persistent economic decline assumed in the *Protracted Depression* scenario would mean that the banking sector's credit losses would rise more than 2.5 times over the three-year test horizon. At the same time, it should not be overlooked that the currently low interest rates on loans may partly be concealing distress among many debtors as regards their ability to service debts with their existing income flows.

The concentration of the portfolios of banks, insurance companies and pension funds on domestic government bonds continues to rise

Within the financial sector, the concentration of the portfolios of banks, insurance companies and pension funds on domestic government bonds continues to rise. This is further increasing the links between the financial sector and the government sector. Owing to a decline in Czech bond yields during 2012, domestic financial institutions recorded a rise in gains from the revaluation of some of these instruments to fair value. In future, this may represent a risk of a decline in the market prices of the securities held, with an adverse impact on profitability, if the financial market situation changes suddenly.

Credit unions remain highly risky; some institutions should increase the prudence of their business

Despite a relative year-on-year improvement in some aggregate risk indicators and in the NPL coverage ratio in credit unions, these indicators deteriorated substantially in 2013 Q1. Maintaining relatively high interest rates on deposits in the current period of low rates represents a risk to credit unions, creating an incentive to grant risky loans at high interest rates. The credit union sector also shows a high concentration of loans provided. Any repayment problems among important clients could jeopardise the unions' stability. Some institutions should also considerably increase the prudence of their business and the quality of their risk management.

The domestic financial system was exposed to strong shocks in stress tests

With regard to the risks identified above, the resilience of the domestic financial system was assessed as usual by means of stress tests on banks, insurance companies and pension funds using a *Baseline Scenario* and a *Protracted Depression* stress scenario. The *Baseline Scenario* is considered by the CNB to be the most probable. The stress scenario describes the risk of a long-lasting and pronounced decline in domestic economic activity caused by low external demand and falling domestic consumption and investment. A long-lasting adverse economic situation will erode the financial reserves of households and non-financial corporations and cause a significant deterioration in their ability to repay their debts, leading to high credit losses in the banking sector. This scenario is supplemented in sensitivity analyses with other shocks, e.g. the assumption of adverse financial market developments, write-downs of claims on indebted EU countries, collapse of the largest debtors of each bank and the assumption of a much deeper recession leading to a significant increase in credit losses in the banking sector.

According to the stress tests, banks, insurance companies and pension funds are resilient to shocks

The stress tests demonstrate that the banking sector remains highly resilient to adverse scenarios even in a recession. Banks have a large capital buffer which enables them to absorb adverse shocks and maintain the sector's overall capital adequacy sufficiently above the regulatory threshold of 8% even in a very unfavourable scenario. Banks also passed a liquidity stress test. The insurance company sector also showed sufficient resilience to an adverse scenario thanks to its large capital buffer. The pension fund sector remains sensitive to the price volatility of securities holdings, but a capital increase in 2012 enhanced its resilience compared to the previous year.

SYSTEMIC RISK AND MACROPRUDENTIAL POLICY

The modest credit recovery ended with the onset of the recession, and credit growth is currently subdued

The domestic financial sector is currently in a phase of the financial cycle dominated by risks relating to the weak economic activity seen over the last few years. Although the sector's lending capacity is not limited by a lack of balance sheet liquidity or capital, increased risk aversion and an absence of optimistic expectations are not creating conditions for increased credit activity reflected in excessive risk-taking. The modest post-crisis credit recovery observed in 2010–2011 ended with the onset of the recession and demand for loans and risky assets is now subdued despite the historically low interest rates. As a result, the Czech financial sector faces no risks due to excessive credit growth, and if the CNB had the option of using a countercyclical capital buffer it would set it at zero for exposures in the domestic economy for the next two years.

The interest rate component of the credit conditions is having a countercyclical effect

One positive development is that the interest rate component of the credit conditions has eased further, dampening the risks connected with the economic contraction and having a countercyclical effect. Interest rates on new loans are at record lows for both of the most important bank loan categories, allowing corporations and households to move gradually to lower debt servicing costs commensurate with the new macroeconomic environment. As stated above, however, very low interest rates may sometimes imply credit margins that are not necessarily consistent with credit risk.

The links between financial institutions are increasing

The links between financial market segments are the source of the structural component of systemic risk. In 2011 and 2012, most of the direct links between sectors intensified further. Indirect links through exposures to the same sectors were strengthened by the rising exposure of all segments to the government sector. Growth in the links between non-bank financial corporations has been observed in the financial corporations sector in recent years. The structural component of systemic risk is being suppressed by robust banking sector liquidity. In conditions of low deposit interest rates, however, the ratio of liabilities payable on demand to total liabilities is rising. This is causing maturity transformation to increase. Overall, therefore, the importance of the structural component of systemic risk is gradually rising.

The potential risks associated with the fact that a large proportion of banks' assets are held in government bonds require attention

Czech banks have a large proportion of their assets held in domestic government bonds and thus have significant exposure to sovereign risk. As the Czech Republic's current fiscal situation is stable and sustainable, this exposure – despite its size – does not pose an immediate threat to financial stability. However, some banks are showing elevated concentration risk. To mitigate this risk, the regulator can impose an additional capital requirement on banks under Pillar 2 if necessary. In addition to sovereign risk, government bond holdings bear interest rate risk. The current very low yields on domestic government bonds may prove to be unsustainable in the long term. The CNB will assess the intensity of this risk on an ongoing basis, and if it decides that the capital requirement for the general interest rate risk of the trading portfolio under Pillar 1 is inadequate, it will consider increasing it under Pillar 2.

The property financing segment is a significant source of credit risk for banks

Despite a relative stabilisation of the property market and a recovery in sales in residential development projects, the NPL ratio in this segment remains high. This contrasts to some extent with the asymmetric easing of lending conditions for the dominant segment of loans for house purchase in both 2012 and 2013, which is probably due to competition between providers of these loans. Given the high proportion of property financing loans in banks' balance sheets, the CNB is preparing a set of appropriate instruments enabling it to react to any risks associated with movements in property prices and loans to this sector.

Banks must maintain a high ability to absorb potential credit and market losses

To maintain high public and investor confidence in the stability of the Czech banking sector in the current adverse economic environment, banks must maintain a high capacity to absorb potential credit and market losses. The CNB will therefore continue to regularly assess the sufficiency of provisions created to cover expected losses as well as the adequacy of capital buffers created to cover unexpected losses on both a solo and consolidated basis.

The regulator's powers to set specific capital surcharges will enhance the robustness of systemically important banks

Maintaining robust capital buffers in systemically important banks is of particular importance. The recently approved EU Capital Requirements Directive, known as CRD IV, allows the national regulator to set requirements for domestic banks partly also on the basis of their size and importance, and therefore on the basis of the impact their collapse would have on the stability of the financial sector and the economy as a whole. The national regulator may set additional capital buffers for systemically important banks. Given the dominant role of banks in the Czech financial system and the high concentration of the Czech banking sector, the CNB is ready to apply these capital buffers in the future. CRD IV and CRR will also enable the CNB to apply other previously unavailable macroprudential tools. However, some elements of the banking union project may hinder the conduct of macroprudential policy in the EU.

2 THE REAL ECONOMY

2.1 THE MACROECONOMIC ENVIRONMENT

The optimistic expectations of a recovery in advanced countries failed to materialise in 2012. The euro area recorded a contraction in economic activity, accompanied in some countries by worse credit availability for the private sector. Very easy monetary policies, which are reducing debt servicing costs via low interest rates, are helping to resolve the adverse income situation of non-financial corporations and households. Very low short-term rates may, however, encourage some financial market segments in some economies to take excessive risks. The Czech economy also saw quite a noticeable fall in economic activity in 2012, and its economic prospects for 2013 remain unfavourable as well. Given the stability of the banking sector, however, there is no danger of reduced loan availability, and the easy interest rate component of the credit conditions will continue to dampen growth in credit risk, which is being strengthened by the continuing recession. Conditions for a deeper balance-sheet recession process are not materialising in the Czech Republic either. The main risk to the Czech economy thus remains a further economic slowdown in Germany and other countries that are major trading partners of Czech corporations as a result of continuing problems in the euro area.

The optimistic expectations of a global economic recovery failed to materialise

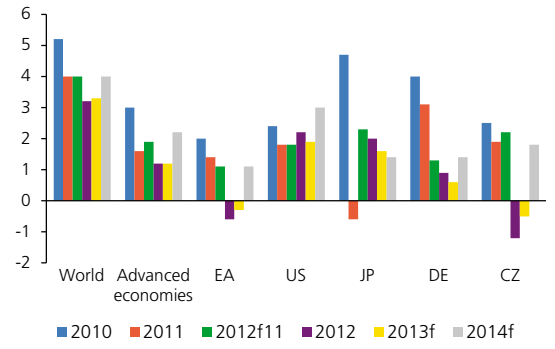
Economic activity in advanced economies was flat in 2012, remaining below the original forecasts (see Chart II.1). The emerging economies also recorded worse-than-expected results – they continued to show dynamic growth, but the growth slowed year on year (see Chart II.2). The USA was the only major advanced economy to post a better-than-forecasted recovery for 2012 and show robust signs of improvement. By contrast, the euro area economy continued to contract gradually.

The forecasts for this year expect a continued contraction in euro area real GDP, and the longer-term outlook is very uncertain

The late 2012/early 2013 forecasts expect the global economy to recover partially in 2013. The renewed growth should be driven mainly by emerging economies (the yellow and grey columns in Charts II.1 and II.2). By contrast, economic activity in the euro area is expected to decline slightly further, with a possible recovery at the end of 2013 at the earliest. The prevailing optimistic expectations about the economic situation in Germany boded well for the Czech economy, but the April business conditions survey results shifted these expectations to a more pessimistic level. Leading indicators of economic activity and confidence indicators in advanced countries remain well below the levels usually seen before the onset of a recovery. The labour market situation in Europe remains very tense, as evidenced by a still rising unemployment rate. Growth in real GDP is expected for 2014 in virtually all regions of the world economy. Export-oriented countries should benefit the most from this. However, the forecasts for 2014 may again prove to be too optimistic. The global recovery will be hampered by high government and

CHART II.1

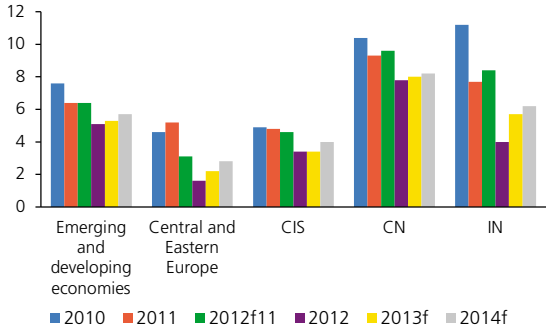
Economic growth worldwide and in the advanced economies
(year-on-year growth in %; outturns and October 2011 and April 2013 forecasts)



Source: IMF (World Economic Outlook, April 2013) and CNB (May 2013 macroeconomic forecast)
Note: 2012f11 is the October 2011/November 2011 forecast for 2012.

CHART II.2

Economic growth in emerging and developing countries
(year-on-year growth in %; outturns and October 2011 and April 2013 forecasts)



Source: IMF (World Economic Outlook, April 2013)
Note: 2012f11 is the October 2011/November 2011 forecast for 2012.

private sector debt in advanced economies, accompanied by rising debt in emerging economies.

The Czech economy remains in recession

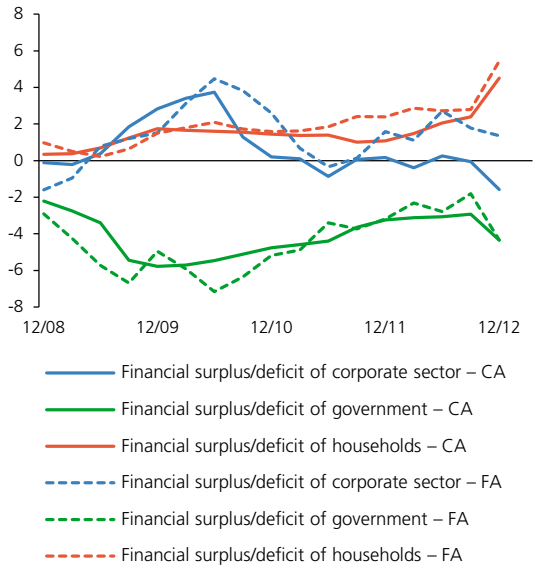
Czech real GDP fell by 1.2% in 2012. The decline deepened year on year in each successive quarter. Net exports were the only positive contributor to real GDP growth. By contrast, the demand side of the economy was dampened most strongly by household consumption (see section 2.3). In addition to the adverse income situation, the factors behind the contraction in domestic demand in 2012 included prevailing pessimism and a rising saving rate. An increase in the reduced VAT rate (and expectations of an increase in both VAT rates in January 2013) and a fall in government investment also adversely affected demand. The current CNB forecast, issued in May 2013, expects a further modest contraction in real GDP this year, replaced in 2014 by a relatively robust recovery in line with developments in the euro area. Given the present situation in the euro area, however, the risk of the Czech economy remaining in recession for a longer time needs to be taken into account. A stress scenario entitled *Protracted Depression* was defined on the basis of this risk.

The risks associated with balance-sheet recession are not materialising so far in the Czech Republic

A balance-sheet recession[1] is a process arising as a result of the bursting of a debt-financed bubble on the asset market and a subsequent deterioration of the ratio between the market prices of assets and liabilities. Economic agents react to this by trying to repair their balance sheets by rapidly paying down debt (the increased supply of financial surpluses is not accompanied by a commensurate increase in investment demand). This effort is usually long-term in nature and can lead to a protracted recession accompanied by deflationary pressures. Although no major bubble formed on the property or other asset markets in the domestic economy in the pre-crisis years, in light of external developments it is necessary to check whether the economy is showing any signs of a more moderate form of balance-sheet recession, which can be described as a deterioration in the expected ratio of the discounted value of future income to debt payments. The national accounts data on the financial surpluses/deficits of individual sectors can be used to do this.[2]

CHART II.3

Financial surpluses/deficits by sector
(annual moving totals as a ratio to GDP, %)



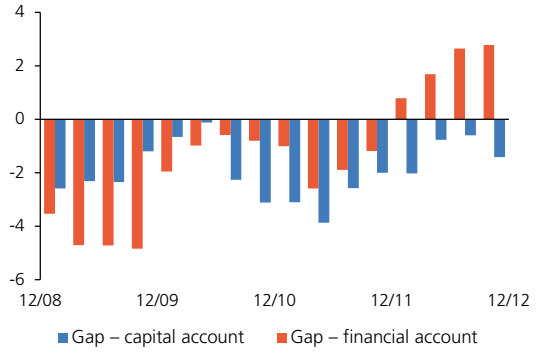
Source: CNB, CZSO
Note: FA and CA refer to the balancing items of the financial account and capital account respectively. The two balancing items measure the sector's financial surpluses/deficits and should be equal in theory. The differences in the indicators are due to measurement errors and statistical discrepancies.

1 Balance-sheet recession is one of the most frequently discussed pessimistic scenarios for future development in recent years. The balance-sheet recession concept was explained and analysed in more detail in Box 1 in FSR 2011/2012.

2 The economic term financial surplus/deficit is used as an equivalent to item B.9 *Net lending/borrowing*, which is a balancing item of the capital account and simultaneously a balancing item of the financial account. Although the balancing items of the two accounts should be equal in theory, they are not the same in practice due to statistical discrepancies and data mismatches. The general government deficit measured by net borrowing is not identical to the officially reported government deficit (EDP) because of a slightly different definition of the financial instruments included in the relevant deficit.

CHART II.4

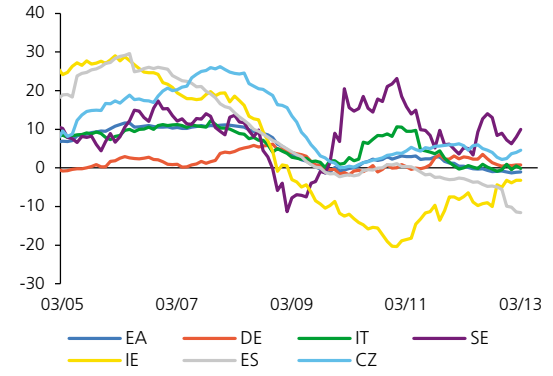
Gap between private sector surpluses and the government financial deficit
(as % of GDP)



Source: CZSO (capital account), CNB (financial account)
Note: The gap is calculated as the difference between the financial surpluses of the private sector (households + corporate sector) and the general government deficit.

CHART II.5

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



Source: Thomson Datastream, CNB

Some signs of a balance-sheet recession scenario can be seen for households, where the ratio of financial surpluses to GDP rose by more than 3 pp last year (see Chart II.3). Such a rise in the time series is very unusual and may represent a real change in households' behaviour. By contrast, the current indicators for the corporate sector (non-financial corporations and financial institutions) – despite growing differences in the available statistics – are not signalling the presence of previously unobserved changes in behaviour going beyond a standard cyclical recession. The overall evaluation of the risk of balance-sheet recession is ambiguous due to incompatible data sources (see Chart II.4). Despite this, it can be concluded that the aforementioned data cannot for now be interpreted as meaning the materialisation of a balance-sheet recession, especially in light of the capital account data (which are probably more reliable in this case). These data show that households' surpluses were spent on an increased deficit of general government, which recorded a widening financial deficit in 2012 Q4. This can be interpreted as meaning that there is currently no major fall in domestic demand hindering the use of surpluses abroad and that household surpluses were sufficiently employed by general government.

The monetary policies of advanced economies remain easy

The key central banks continued to pursue supportive policies and in some cases extended those policies further. The European Central Bank (ECB) launched a programme of Outright Monetary Transactions (OMTs), declaring its readiness to purchase bonds of problem euro area countries in secondary markets on request provided that the countries concerned undertake to take remedial measures (see section 3.1). The ECB also relaxed some of its collateral eligibility rules for monetary operations. However, the ECB's active stance has given rise to expectations that this institution is the key to solving most of the euro area's problems. This is reducing the pressure on political bodies to implement radical stabilisation measures and structural reforms. The Federal Reserve reacted in a similar way to the ECB, first extending its Twist programme for long-term bond purchases financed by sales of shorter-term securities and then replacing the Twist programme with direct asset purchases. The Bank of Japan also announced a further series of supportive operations in spring 2013 directed at increasing the very low level of inflation in Japan. The Bank of England extended its Funding for Lending programme focused on providing advantageous loans to the private sector with the aim of providing more support to small and medium-sized enterprises.

The euro area financial environment is fragmented

The fragmentation of some segments of the euro area financial market and of the EU as a whole increased further in 2012. Despite the single monetary policy, corporations in different euro area countries are able to obtain loans at very different interest rates. As a result of a crisis of confidence, banks in some countries are facing higher financing costs, which they are passing on to corporate borrowers. Those borrowers are then at greater risk of failure due not only to lower economic activity, but also to higher debt service costs. Bank lending surveys in euro area countries are indicating considerably tighter lending conditions for small

and medium-sized enterprises than for large enterprises. The government bond market also remains fragmented, as public debt financing is very cheap in some euro area countries, but quite expensive in others (see section 3.1). However, the differences in demanded yields are not always fully explained by the public debt-to-GDP ratio and other sovereign risk determinants.

Lending is strongly impaired in part of the euro area

Despite the ECB's supportive policy and very low money market interest rates, loans to the private sector are very slowly decreasing in the euro area as a whole. In some countries the fall in loans is quite pronounced (see Chart II.5). The causes of the stagnation of lending can be found on both the demand side and the supply side. According to the Bank Lending Survey, the main wave of tightening took place in early 2012, but some tightening is still going on (see Chart II.6). The growth in lending in advanced non-euro area European countries is also highly heterogeneous, but it is mostly positive and no major supply-side constraints are being observed.

The credit market situation in the Czech Republic is favourable

According to the Bank Lending Survey (BLS), the credit conditions for non-financial corporations in the domestic economy also tightened slightly in 2012. However, corporate demand for loans still increased modestly. A similar trend in the credit conditions was seen in 2013 Q1. Households' demand for loans did not increase in 2012 and a moderate rise was recorded only in early 2013. An asymmetric phenomenon is an easing of the credit conditions for house purchase loans in both 2012 and 2013. This is probably due to competition between providers of this type of loan (see Chart II.7).

Income growth remains very subdued in the Czech Republic

The macroeconomic situation is not conducive to a credit market recovery and a reduction in credit risk. Nominal income growth is lagging well behind pre-crisis expectations, which reflected the nominal GDP growth rates seen at that time (see Chart II.8). Whereas non-financial corporations were able to partially offset the falling or weakly rising income by cutting labour costs as early as 2011, and are thus often maintaining a sufficient level of profits, households have fewer ways to adjust and are being hit much harder by the above developments. The situation of households will probably worsen further in 2013. The CNB's May 2013 forecast expects households' gross disposable income to fall by 0.5% on average in 2013 and 2014 amid growth in the unemployment rate (of 1.4 pp between 2012 and 2014). This will probably affect low-income households the most (see section 2.3). If the assumptions of the *Protracted Depression* scenario materialise, the fall will be much stronger (the violet columns in Chart II.9).

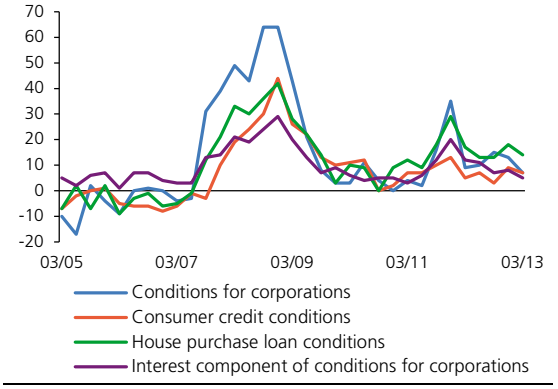
Low interest rates are favourably affecting debt servicing costs

Debt servicing costs went down in 2012 for both loans to corporations and loans to households in the Czech Republic and in most euro area countries. Both existing loans (see Chart II.10) and new loans (see Chart II.11) recorded a decline in such costs, thanks to easy

CHART II.6

Lending conditions in the euro area according to the Bank Lending Survey

(differences in market share of banks in pp)



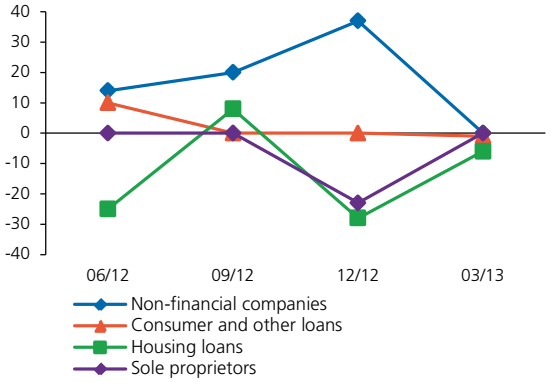
Source: ECB, Thomson Datastream

Note: The data represent the difference between the market share of banks which reported a tightening of the credit conditions and banks that reported an easing of the credit conditions in the past three months.

CHART II.7

General lending conditions in the Czech Republic

(differences in market share of banks in pp)



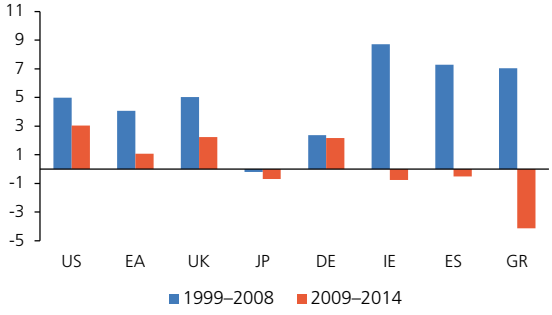
Source: CNB

Note: The data represent the difference between the market share of banks which reported a tightening of the credit conditions and banks that reported an easing of the credit conditions in the past three months. More details on the indicator methodology can be found on the CNB website.

CHART II.8

Nominal GDP and nominal GDP forecasts for selected countries

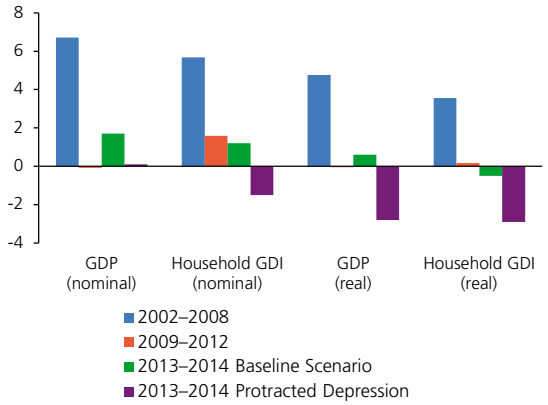
(average year-on-year growth in %)



Source: OECD

CHART II.9

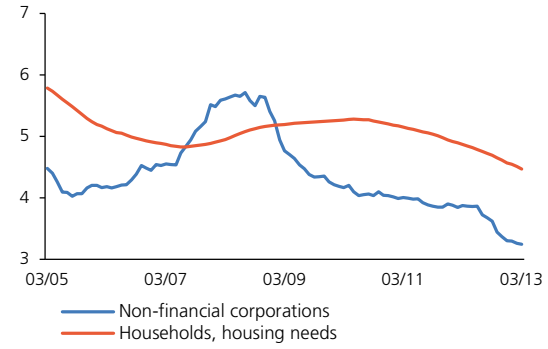
Macroeconomic income aggregates in the Czech Republic in reaction to different scenarios
(average year-on-year growth in %)



Source: CZSO and CNB forecast
Note: GDP – gross domestic product, GDI – gross disposable income.

CHART II.10

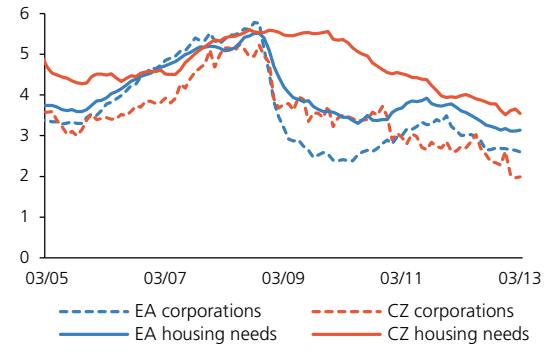
Interest rates on loans
(% p.a. on total stock of loans)



Source: CNB

CHART II.11

Interest rates on new loans in the Czech Republic and the euro area
(% p.a.)



Source: ECB, CNB
Note: Bank overdrafts and revolving loans are excluded.

monetary policies and an ample supply of savings. One possible risk of the current favourable interest rate conditions – even though they are consistent with present inflation and economic activity – is that of nominal illusion leading to a situation where debtors overestimate their own borrowing capacity. This risk applies not only to corporations and households, but also to governments (see section 3.1).

The net external debt of the government is continuing to rise

The Czech Republic's external balance developed quite favourably in 2012. The coverage of external debt by banks' external assets improved from 53% to 59%. The ratio of net external assets to external debt increased as well, from 68% to 71% (see Chart II.12). The net investment position improved slightly, and the net investment position excluding foreign direct investment and government external debt in fact saw a significant improvement. At the same time, the net debtor position of non-financial corporations continued to fall and the net creditor position of the banking sector continued to improve (the net debtor position of banks has improved by more than CZK 100 billion in the last six quarters). By contrast, government net external debt continued to trend up for the fourth consecutive year (from CZK 291 billion in 2008 to CZK 548 billion in 2012; see Chart II.13). From the long-term perspective, the rise in government net external debt could become a source of systemic risk (see also section 3.1 and the thematic article *Fiscal Sustainability and Financial Stability*).

Government debt in the Czech Republic is rising only slowly…

Rising government debt is still one of the main threats to financial stability in Europe. The Czech economy currently has a favourable level and rate of growth of government debt among the advanced European countries. Its ratio of short-term debt, which is generally considered more difficult to refinance than long-term debt, also remains low. Thanks to measures taken on both the revenue and expenditure sides of public budgets, the government deficit is relatively low. Continued fiscal consolidation should ensure that it falls to 2.9% of GDP in 2013 according to the CNB's May forecast. The deficit should decrease slightly further in 2014 and 2015. However, the true rate of growth of government debt is better illustrated by the structural deficit, i.e. the deficit adjusted for the business cycle, than by the current fiscal deficit. Despite the government's consolidation efforts, the structural deficit should stay at about 2% of GDP at least until 2015. The government debt-to-GDP ratio can be expected to exceed 48% of GDP at the end of 2015 (see Chart II.13). The government debt will thus start to approach levels at which doubts may arise about its sustainability in certain circumstances (see the thematic article *Fiscal Sustainability and Financial Stability*). However, the structural characteristics of the Czech government debt reduce this risk significantly.

… and the Czech Republic's fiscal situation is assessed as stable

The Czech Republic's current fiscal situation is regarded as stable. The gross government borrowing need in 2012 was CZK 309 billion.[3] This represents a rise of about 20% on 2011. However, the increase was due among other things to the creation of a debt reserve[4], which should fall back below the 2011 level in 2013–2015 according to Czech Ministry of Finance estimates. Although the foreign currency exposure of Czech public debt is more than double the pre-crisis level, it is still low compared to other European countries (the Ministry of Finance estimate for the end of 2012 is 10% and the debt strategy sets an suitably strict ceiling of 15%). As mentioned above, future efforts to raise considerably more funds for government debt financing on foreign markets may pose a risk to financial stability.

Euro area public finances remain a strong source of uncertainty

The public finance situation in the euro area is not creating the necessary conditions for the debt crisis to end quickly. Similarly, the plan to break the vicious circle between the public finances of national governments and national banking sectors by establishing a euro area banking union has not gained sufficient credibility (see Box 1 in section 4 and Box 2 in section 5), mainly because of disputes and doubts over some of its key elements. Although euro area countries, like other advanced economies, are vowing to continue their consolidation efforts in the years ahead, the current IMF forecast indicates[5] that their government debt-to-GDP ratios will generally rise further.[6] This trend may be bolstered to some extent by the current pressures to adjust fiscal plans towards "growth-friendly consolidation", which will be difficult to implement without increased debt-financed government expenditure. In such a situation, some economies may experience a renewed adverse reaction by the financial markets and thus also show signs of a debt crisis (see section 3.1).

Alternative economic scenarios

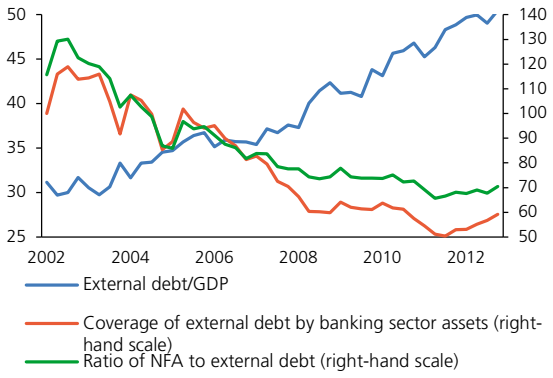
Alternative economic scenarios were defined on the basis of potential alternative future macroeconomic trends along with the risks identified. These scenarios are used mainly in section 4.2 to test the resilience of the Czech financial sector. The paths of key variables in each scenario are shown in Charts II.14 a–d.[7] 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[8] and property prices) is presented in the following sections.

3 Czech Ministry of Finance, *Funding and Debt Management Strategy for 2013*.
4 Its effect was 1.8% of GDP.
5 International Monetary Fund, *Fiscal Monitor*, April 2013.
6 Germany will be the exception according to the above forecast, as its budget was in surplus already in 2012.
7 The paths for the *Baseline Scenario* in the first two years are based on the CNB's official prediction. Beyond this horizon they are extrapolated towards the expected long-term equilibrium values.
8 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.12

Ratio of the gross external debt of the Czech Republic to GDP and its coverage by the external assets of financial institutions

(%)

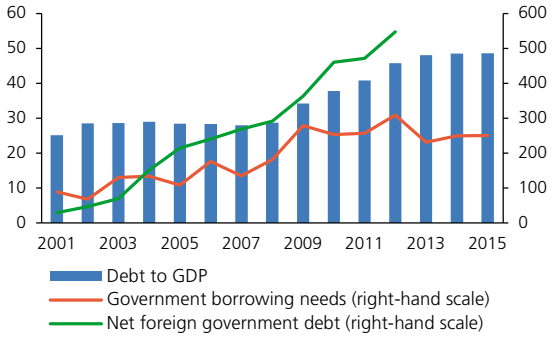


Source: CNB
Note: External assets of the banking sector (including the CNB) from the balance of payments statistics and net external assets of MFIs from the monetary survey.

CHART II.13

Government debt-to-GDP ratio and gross government borrowing needs

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

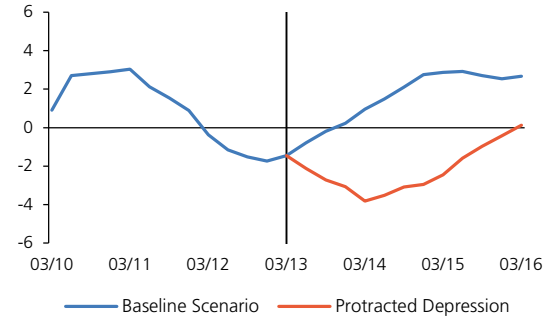


Source: CZSO, CNB, MF CR
Note: CNB estimates used for the debt-to-GDP ratio for 2013–2015 and MF CR estimates used for central government borrowing needs.

CHART II.14A

Alternative scenarios: real GDP growth

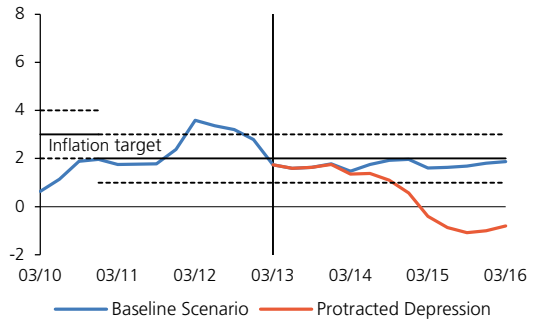
(year on year, %)



Source: CNB

CHART II.14B

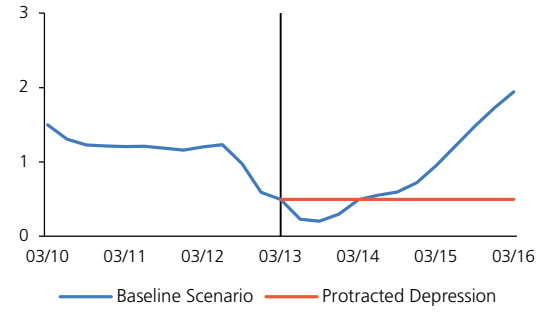
Alternative scenarios: inflation
(year on year, %)



Source: CNB

CHART II.14C

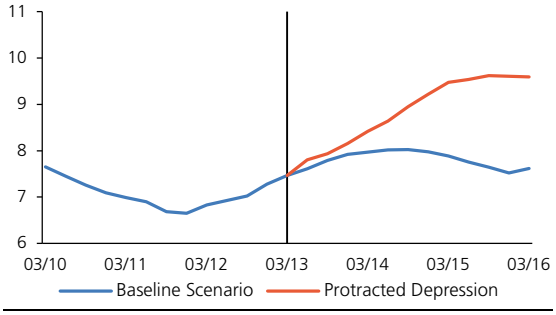
Alternative scenarios: 3M PRIBOR
(%)



Source: CNB

CHART II.14D

Alternative scenarios: unemployment
(%)



Source: CNB

The ***Baseline Scenario*** is based on the CNB's official May macroeconomic forecast published in Inflation Report II/2013 and assumes a decline in economic activity this year due to generally weak domestic demand and only moderately recovering external demand. The previous year's dampening factors are expected to subside in 2014 and the economy will return to relatively robust growth. The general unemployment rate will continue to rise in 2013 and will remain at an elevated level of around 8% until the end of 2014. The forecast also expects inflation to stay below the CNB's 2% target despite an increase in indirect taxes. Consistent with the forecast is a slight decline in market interest rates, followed by a rise in rates as from the end of 2013. The koruna-euro exchange rate will appreciate very slowly over the forecast horizon from a weak initial level.

The ***Protracted Depression*** stress scenario assumes a long-lasting and pronounced decline in domestic economic activity caused by low external demand and falling domestic consumption and investment. This is associated with persisting uncertainty regarding the resolution of the euro area debt crisis and with a loss of confidence in the authorities' ability to deliver an economic recovery by means of economic policy. The continuing elevated uncertainty is reflected in an increase in the negative expectations of the private sector. This leads to high risk aversion among households and efforts by households to create precautionary savings, and to further deferral of corporate investment. The combination of low external and domestic demand in turn will cause a significant contraction in economic activity in the Czech Republic, which will further affect the household sector through rising unemployment and falling wages. The long-lasting adverse economic situation will erode the resources of households and non-financial corporations and cause a significant deterioration in their ability to repay their debts, leading to high credit losses in the banking sector. The situation will improve again in 2016, when economic growth will rebound. Monetary policy remains easy and the three-month PRIBOR stays constant over the entire test horizon. No foreign exchange interventions are assumed.

The *Protracted Depression* stress scenario is complemented by sensitivity analyses that extend the range of risks tested and illustrate the resilience of selected segments of the financial sector (banks, insurance companies and pension funds) to alternative adverse developments. The sensitivity analyses, predicting a loss of investor confidence in the Czech economy, a write-off of part of the banking sector's exposures to indebted EU countries and a strengthened variant of *Protracted Depression*, are presented in section 4.2.

2.2 NON-FINANCIAL CORPORATIONS

The adverse economic situation was reflected in worsening corporate financial results and represents the main risk to the financial stability of corporations in the period ahead. Negative signals are also starting to emerge in industries that were previously drivers of the economy. As the period of adverse developments lengthens, a further increase in risks and a shift towards risk materialisation can be expected. Credit risk was at an acceptable level in 2012, but leading indicators are showing a future increase. This may be amplified by some forms of credit risk undervaluation across the banking system and by the materialisation of the assumptions of the Protracted Depression stress scenario. Limited investment opportunities led to subdued growth in total debt and slower credit growth. Low interest rates helped improve the debt sustainability indicators and prevented the credit problems of corporations from escalating. Given the sector's increasing dependence on exports, further developments will be affected largely by the situation in trading partner countries.

The decline in economic activity is negatively affecting the sector's financial results…

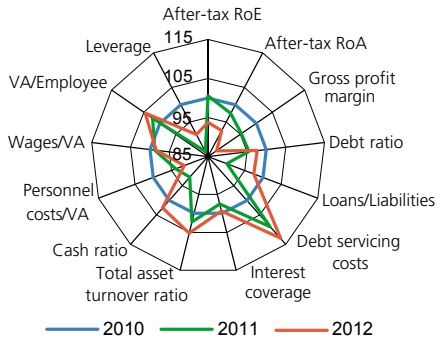
The renewed recession resulted in a deterioration of performance indicators in non-financial corporations. Weakening domestic demand and slowing net exports reduced margins, thereby curtailing the profit potential of the sector and leading to a decline in return on equity and return on assets (see Chart II.15). The falling values of the business confidence indicator suggest that corporations do not expect the situation to improve in 2013, so the financial stress will probably increase. The lengthening time for which the sector has remained exposed to adverse conditions may accelerate the materialisation of accumulated risks and endanger small and medium-sized enterprises in particular. In line with these developments, the results of the survey of non-financial corporations indicate a decline in investment expenditure, limited wage growth and an overall decrease in employment this year.

The nature of the risks themselves is little changed from the previous year, and adverse economic developments are still the main risk to the sector's financial stability. However, the duration of the recession is shifting the risk level upwards and, given the non-linear relationship between the sector's financial soundness and the accumulated risks, corporate balance sheets may worsen quickly and sharply if the adverse developments continue. According to the assumptions of the *Baseline Scenario*, the situation of corporations will not improve until 2014. This improvement will be fostered by a gradual recovery in external demand in 2013 H2. However, given the current situation in the euro area, this forecast is subject to considerable uncertainty. The outlook for domestic demand, which is affected by difficult-to-predict consumer sentiment in addition to the income situation of households, is also uncertain (see sections 2.1 and 2.3).

On the other hand, the fall in the performance of the sector dampened credit growth and fostered subdued growth in total debt. An escalation

CHART II.15

Key financial indicators for non-financial corporations
(2010 = 100; increase in index means improvement)

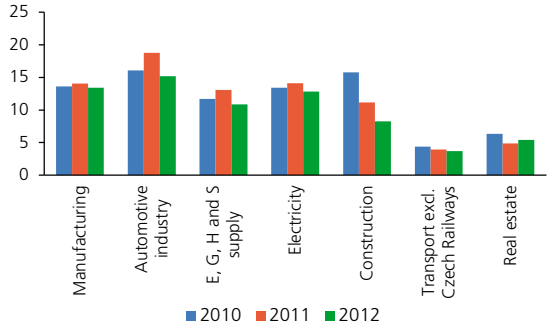


Source: CZSO, CNB
Note: The results are based on a sample of corporations.

CHART II.16

After-tax RoE in selected branches of activity

(%)

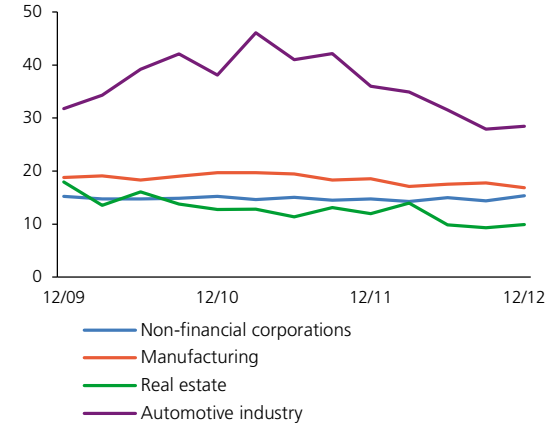


Source: CZSO, CNB
Note: E, G, H and S are electricity, gas, heat and sewerage. The results are based on a sample of corporations. Property development projects are included under construction. The automotive industry contains companies in NACE 29.

CHART II.17

Margins on sales in selected branches of activity

(as % of sales)



Source: CZSO
Note: The results are based on a sample of corporations. The automotive industry comprises companies in NACE 29.

of the credit problems was prevented mainly by low interest rates, which helped improve the (short-term) debt sustainability indicators (see Chart II.15). Thanks to the lower interest rates, non-financial corporations recorded savings of more than CZK 3.5 billion compared to 2011 and the ability of Czech firms to service their debt is also favourable by international comparison (see also line NC.7 in the Table of Indicators). The loss of investment opportunities led partly to an accumulation of funds, reflected in an increase in total liquidity.

… in addition to construction, industries that were drivers of the economy in previous years are also at risk of decline

Although the situation differed across segments, the economic decline affected profitability in almost all industries (see Chart II.16). A significant decrease was again recorded by the construction industry, which has been facing a shortage of orders for several years now, especially in civil engineering and building construction. A change for the better is unlikely to occur in the near future, as the relevant statistics for this segment are showing no signs of recovery. Moreover, unlike in other industries, where cutting working hours is preferred, the developments in construction are associated with significant job cuts. Like construction, the services segment is facing sustained problems and its value added has been falling continuously since 2009.

The end-2012 results indicate that previously strongly growing industries, including manufacturing, are also entering a downward phase owing to the continuing recession. From the structural point of view, the high sensitivity of the Czech economy to the automotive industry seems risky for the period ahead. Although car manufacturing posted slight growth for 2012 as a whole, it recorded the largest fall within industry overall in 2012 Q4. This was due to adverse conditions on foreign car markets, reflected in a sharp fall in foreign orders in 2012 H2 and a subsequent decline in the value of exports. However, signs of a slowdown are also emerging on the domestic market, as evidenced by a significant fall in the number of cars produced, sold and registered in the Czech Republic in the first few months of 2013. Moreover, sales of cars and their accessories are currently being stimulated at the expense of decreasing margins and favourable price conditions for end-consumers. Although margins remain high compared to other industries and there is some room for them to fall further, sellers may hit their limits in the near future (see Chart II.17). Given the strong orientation of Czech industry towards this branch of activity, an escalation of difficulties would lead to a protracted stagnation of the sector and large losses for related industries.[9] In connection with the situation in the automotive industry, a decline in production is now also apparent in the plastics and rubber industry.

9 The car industry accounts for almost 10% of the sector's total value added and more than 50% of exports of industrial products.

Credit risk indicators are not showing any major deterioration so far, but will rise in the future

Despite the difficult economic situation, credit risk was relatively favourable, although the current tendencies in the monitored indicators should not be overestimated. The NPL ratio fell further in 2012 (see Chart II.18), although this was due mainly to write-offs from bank balance sheets rather than lower materialisation of credit risk (for details see section 4.1). A weakening ability to repay loans is indicated by the 12-month default rate, whose latest (partially estimated) values suggest a slight rise in credit risk in the corporate sector (see Chart II.19). This is being accompanied by an increase in the number of loans 1–30 days past due (see Chart V.10). In the pre-crisis period, this indicator indicated rising tension in corporate balance sheets[10] and presaged the future rise in NPLs by more than a year. The rising tension is also reflected in continued growth in the number of insolvency petitions and bankruptcy declarations.

An increase in all the monitored indicators and a further shift towards credit risk materialisation can be expected during 2013. Despite the adverse conditions, however, the deterioration should be gradual and not very strong under the *Baseline Scenario*. By contrast, should the conditions of the *Protracted Depression* scenario materialise, the loan repayment problems in the sector would intensify and credit risk would start to rise significantly. The adverse trend would reverse in late 2014 as a result of a gradual economic recovery. However, credit risk would remain high over the following two years.

The overall credit risk level still masks differences in performance across industries (see Chart II.20). Owing to low demand, shrinking margins and rising input prices, construction (including property development) is one of the most at-risk industries in the long run. However, large and well-capitalised banks, which have a better capacity to absorb any rise in risks, have the largest exposures to this segment. Unlike in the previous two years, the differences between industries did not widen in 2012 and the heterogeneity of the sector remained broadly unchanged in terms of credit risk.

Some bank loans provided to corporations may have a higher-than-declared level of risk

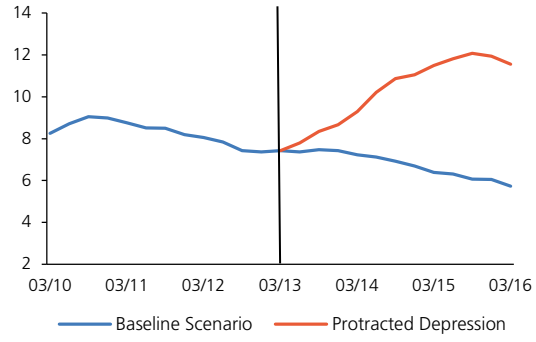
The overall level of credit risk may be underestimated due to different strictness of loan classification criteria across banks, suggesting increasing differentiation in their prudential behaviour (see also section 4.1). Although all loans to a single client within a single bank are categorised as NPLs if problems arise with any of them, this is not always the case across banks and a client may be assessed differently in terms of riskiness in two different banks. Data from the Central Credit Register indicate

10 As only the number, and not the volume, of NPLs has been rising significantly, it is reasonable to assume that it is mainly smaller corporations, which generally take out lower-value loans, that have been getting into difficulty so far.

CHART II.18

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

(%)

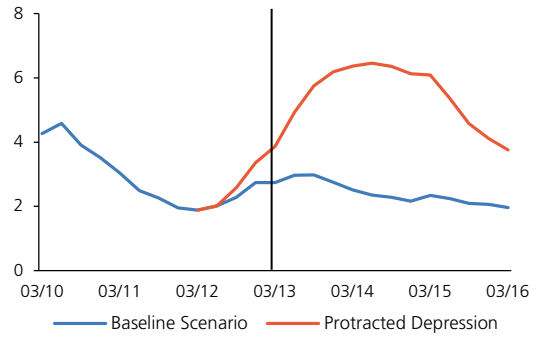


Source: CNB

CHART II.19

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

(%)

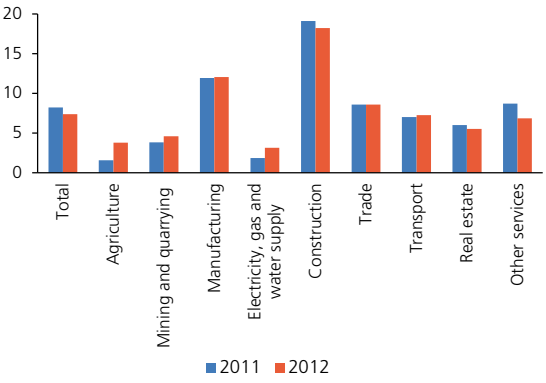


Source: CNB

CHART II.20

NPL ratios in selected branches of activity

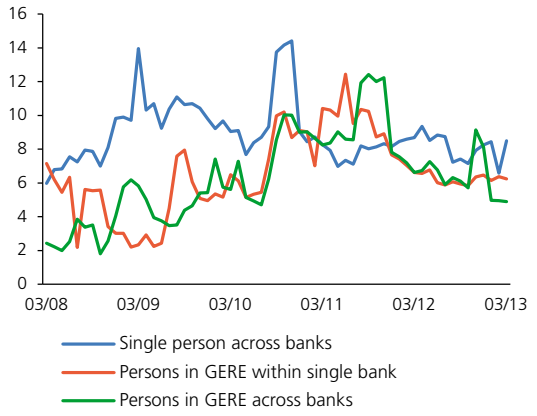
(%)



Source: CNB

CHART II.21

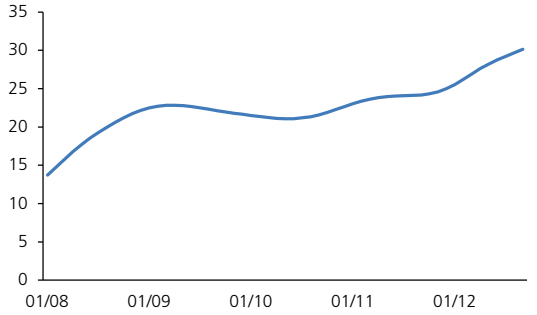
Value of loans at risk of early reclassification as NPLs
(CZK billions)



Source: CNB
Note: GERE stands for "group of economically related entities".

CHART II.22

Bank loans classified as standard for which repayments do not even cover interest
(CZK billions)



Source: CNB
Note: Adjusted using the non-parametric trend function.

that the banking system currently contains 8.5 billion standard (problem-free) loans provided to clients that have at least one NPL with one bank (see the blue line in Chart II.21). This may also be reflected with a lag in the quality of the loan portfolio of the rest of the banking sector, as this set of loans is at risk of being transferred to the NPL category in the near future because of debtor problems.

The total volume of loans at risk of early reclassification to the NPL category will increase further if the differences in perceived riskiness are assessed at the level of loans provided to groups of economically related entities rather than at the level of individual clients. These groups[11] pool persons with close economic or asset links into larger economic units. If a client that belongs to a defined group gets into credit difficulties, loans to the group will not have the same risk classification either across banks or within individual banks. There is therefore again a risk that some loans perceived as problem-free will have to be reclassified as NPLs in the future due to strong links between corporations and to problems in some of them. Although the total amount of these loans has been falling recently, it is still above CZK 11 billion[12] (see Chart II.21). A closer analysis of the data reveals that loans to firms founded for specific property development projects and belonging to larger groups of developers may not have a sufficiently strict classification.

In the hypothetical situation of the entire amount of the above loans (CZK 8.5 billion + CZK 11 billion) being reclassified as NPLs, the NPL ratio would increase by more than 2 pp. Although this risk scenario is implausible and banks would be able to absorb an increase of this size without any dramatic consequences for the financial sector, the data on different risk classification of loans in the banking sector are an important source of information and the CNB will deal with this issue in more detail in the future.

In addition to signs of credit risk undervaluation, growth in some forms of forbearance towards clients can also be observed among banks. This practice is suggested by a gradual increase in the amount of loans that are assessed as problem-free even though total repayment in the past four months does not even cover the interest on the loan (see Chart II.22). Although a large proportion of these loans are "balloon" or "bullet" loans (a special type of loan for which these conditions are laid down directly in the credit agreement), a further

11 The list of groups was drawn up by the banks themselves for credit risk analysis purposes and may not be complete. The results presented below should therefore be viewed as tentative. A group of economically related entities can consist of firms with a holding structure, firms with the same owner, or firms with significant client-supplier links. Information about the allocation of clients to groups is available in the Central Credit Register.

12 This is the sum of loans at risk of reclassification as NPLs provided to entities in a group of economically related entities within one bank and across banks. The total value may be undervalued, as the list of groups of economically related entities is not complete and may not include all the clients that belong to the group. Conversely, the total amount may be overvalued, as relations between entities in a group will not necessarily cause problems in one firm to spread to the rest.

acceleration of this upward trend and an increasing share of such loans in total loans to non-financial corporations may give rise to certain risks.[13] Accordingly, the average time between classification as a watch loan and reclassification as an NPL is increasing. On the one hand, this may foster better anticipation of the future credit risk of corporations and enable banks to prepare better for possible default. On the other hand, it may signal a risk of deferral of the classification of bad loans that should already have been reclassified as NPLs (see also section 4.1). The average time between classification as a watch loan and subsequent reclassification as an NPL has almost doubled in the past five years (see Chart II.23).

The total debt level and the debt structure do not represent a risk to the sector…

Owing to the weak credit activity, the sector's total debt remained essentially unchanged year on year and still seems sustainable thanks to low interest expenses. The debt maturity profile is strongly dominated by long-maturity loans, which allow for more stable and safer financing. There was a partial shift towards debt security financing during the year[14] (see Chart II.24). The largest Czech corporations managed to issue bonds on the market under advantageous interest conditions, and this in turn contributed to the optimisation of debt servicing costs. However, the set of bond issuers is limited and the capital market plays a minor role compared to loan financing. As regards the sector structure of loans received, loans provided by the banking sector have long dominated, as they generally represent a cheaper alternative to non-bank financial corporations and are also better monitored.

… and credit growth is flat despite the low interest rates

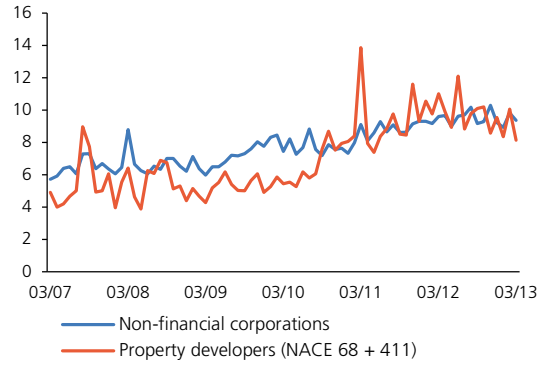
Although interest rates applying to non-financial corporations recorded a further decline to historical lows, this did not provide a sufficient stimulus for a recovery in credit growth in the continuing recession (see Chart II.25). The results of a survey of non-financial corporations reveal that the low interest rates were accompanied by generally good availability of bank loans, hence the low credit growth can be attributed to weak demand for loans.[15] According to the *Baseline Scenario*, this situation – reflecting poor investment sentiment and uncertainty about future developments – will continue and credit growth will remain very sluggish next year. If the assumptions of the *Protracted Depression* scenario materialise, the year-on-year growth rate will fall sharply and the credit cycle will move towards the trough of the recession amid escalating difficulties with insufficient demand.

13 This type of loan is subject to special regulation (see the Official Information of the CNB of 27 May 2011).
14 To a certain extent, this tendency was fostered by advantageous tax conditions for issuing bonds with a face value of one koruna.
15 This issue is dealt with in detail in the thematic article *Modelling Bank Loans to Non-financial Corporations* at the end of this Report.

CHART II.23

Average time between classification as a watch loan and reclassification as an NPL

(months)

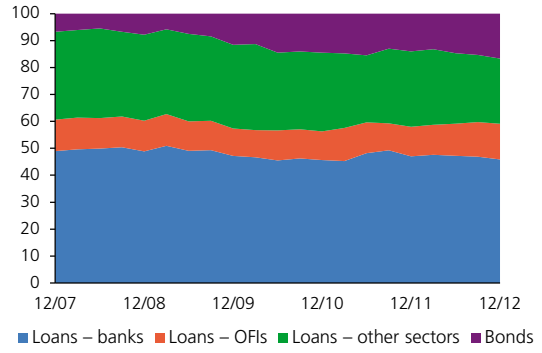


Source: CNB

CHART II.24

Structure of external financing of non-financial corporations

(%)

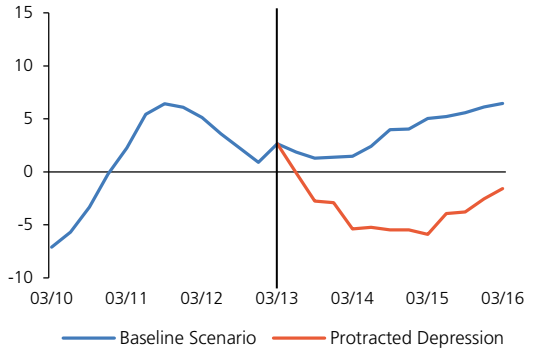


Source: CNB
Note: External sources exclude other liabilities (trade credits, advances, tax arrears, etc.).

CHART II.25

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

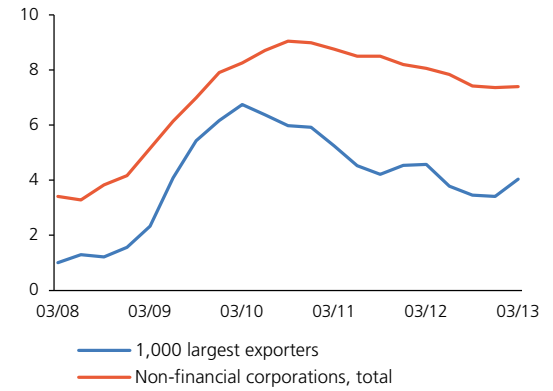
(%)



Source: CNB

CHART II.26

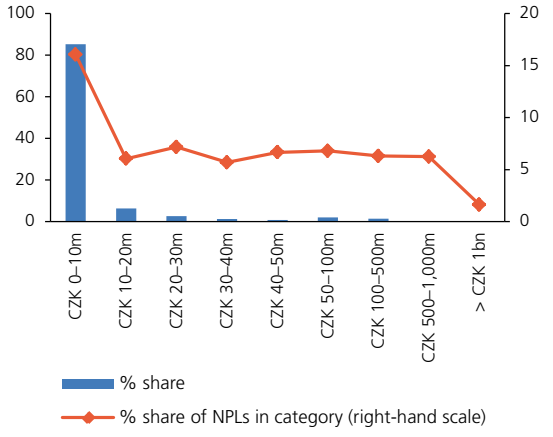
Non-performing bank loans ratio for the 1,000 largest exporters
(%)



Source: CNB

CHART II.27

Breakdown of loans by size and relationship to credit risk
(as % of total number)



Source: CNB

The sector's sensitivity to external developments is increasing

Despite the declining performance of the economy, net exports recorded positive (albeit gradually declining) growth in all four quarters of 2012. This allowed exporters to achieve relatively good financial results (return on equity 3 pp higher than the sector as a whole) and fostered significantly more favourable credit risk materialisation compared to the sector as a whole (see Chart II.26). On the other hand, the stronger role of exports at the expense of weaker domestic demand led to a rise in the potential risks associated with the sector's increasing dependence on conditions in trading partner countries. Globally, the situation in traditionally strong industries such as the automotive industry is generally unfavourable. On the other hand, the robust growth rate of exports to non-EU countries[16] is a positive trend, fostering greater geographical diversification and distribution of potential risks across more geopolitical units. The situation as regards exchange rate risk is also satisfactory. The exchange rate recorded no serious or unexpected fluctuations last year and the *Baseline Scenario* assumes it will remain stable in the period ahead. Accordingly, the natural hedging indicator (the share of foreign currency loans) and the share of exports hedged against exchange rate risk by derivatives remain broadly constant over time.

Foreign parent companies increased their investment in domestic firms

The rise in foreign exposures of non-financial corporations was reflected in a strong inflow of foreign direct investment into Czech firms. 2012 saw a considerable year-on-year increase in reinvested earnings, which were therefore not used to finance foreign parent companies. A solid inflow of other foreign capital (for example in the form of loans from parent companies to their Czech subsidiaries) was recorded at the same time. This is currently contributing to the good capital position of Czech subsidiaries, although in the years ahead their financial condition may depend increasingly on the financial soundness of their parent companies and therefore also on economic developments in their owners' countries.[17] The current satisfactory situation of large corporations, which are almost exclusively foreign-owned, is illustrated by the low level of credit risk on the large loans obtained by these corporations from the domestic banking sector (see Chart II.27). Increased problems in large corporations – caused by problems in parent companies or on the domestic market – would significantly affect the overall level of credit risk.

16 Especially exports to Russia and also, in the first half of the year, exports to China.
17 However, some owners may resolve any problems they might face by selling their Czech subsidiaries rather than by gradually siphoning off their profits.

2.3 HOUSEHOLDS

In line with the general economic conditions, the labour market situation deteriorated in 2012 and the real wages of households again declined. Households responded to the worsening income conditions by reducing their consumption and new borrowing. Together with low interest rates, this helped to stabilise the credit risk of households. Its future level will be affected mainly by the financial situation of young households in and around Prague and Brno, which have the largest amount of loans. They have been repaying their debts relatively easily so far thanks to their above-average income. As a result, it is mainly low-income households that are currently in danger. However, they do not pose too great a risk to banks' balance sheets, as their total debt volume is low.

The real wages of households fell in line with adverse labour market developments

The decline in economic activity in 2012 adversely affected the labour market situation, and the general unemployment rate rose slightly. In some regions the unemployment rate decreased, but in regions which had already been facing high unemployment in 2011 it rose further, exacerbating the unfavourable regional trends in unemployment. The rise in the number of unemployed persons was also accompanied by a drop in the number of vacancies. Household income deteriorated in line with the labour market conditions, with the real average wage falling by 0.6%[18] (see Chart II.28). According to the CNB's May forecast, a worsening of the labour market situation coupled with a decline in purchasing power is also expected in 2013 and will probably be the largest source of risks to the household sector. A slight rise in employment – due to an increase in the number of persons working outside primary employment – was a minor positive signal on the labour market.

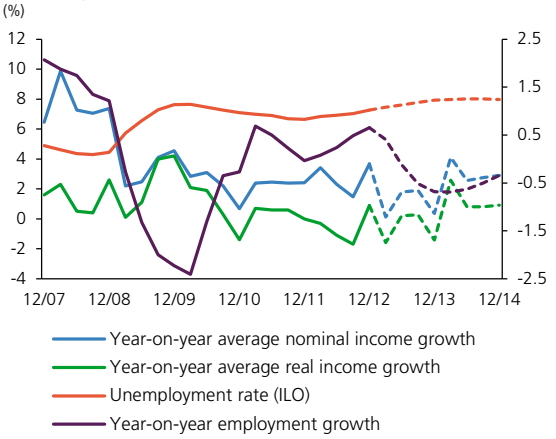
Household debt rose only slightly, which led to a marked rise in net financial assets

Household debt rose only very slightly as a percentage of gross disposable household income in 2012, reaching 57.7% (see Chart II.29). This is still a low level by comparison with other advanced countries. The rise in household credit obligations in absolute terms was also very gradual last year (see Chart II.30). Loans for house purchase recorded the highest growth, rising by 4.8% year on year in 2012. By contrast, consumer credit and liabilities to non-bank institutions edged down. Growth in loans to households should also slow in overall terms over the next two years, and if the *Protracted Depression* scenario materialises it will even turn negative in 2014 (see Chart II.30). Thanks to the limited growth in household debt and virtually unchanged nominal GDP, the upward trend in net financial assets relative to GDP continued for the

18 Different data are provided by the CZSO Household Budget Statistics, according to which real money income including non-wage components grew by 1.6% in 2012.

CHART II.28

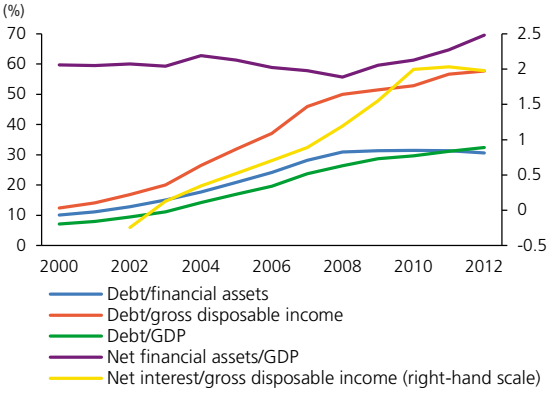
Nominal and real wage growth, employment growth and the unemployment rate



Source: CNB
Note: The unemployment rate is seasonally adjusted. Dashed lines indicate CNB predictions.

CHART II.29

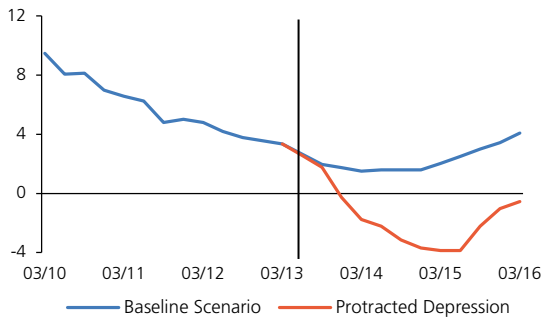
Household debt ratios



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

CHART II.30

Year-on-year growth in bank loans to households

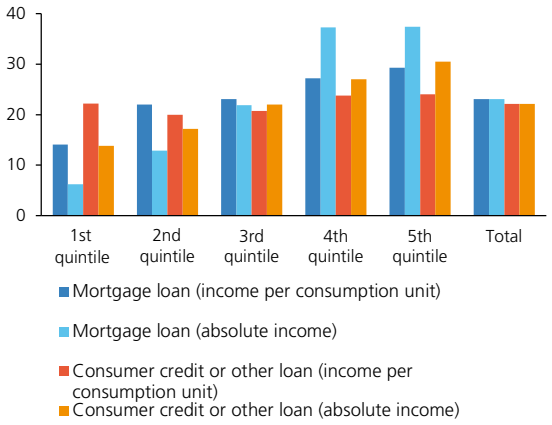


Source: CNB

CHART II.31

Shares of households with loans according to different income quintile definitions

(%)

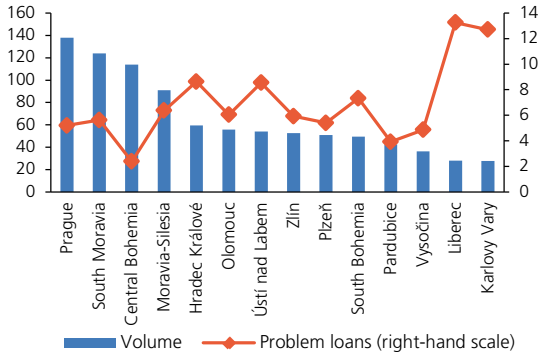


Source: 2011 Household Budget Statistics, CNB calculation
Note: The income quintiles were based on absolute income – light blue and orange columns – and on income per consumption unit – dark blue and red columns. Consumption unit is defined according to the OECD, with the whole unit consisting only of the head of household.

CHART II.32

Loans to households by region and credit risk

(CZK billions; share of problem loans in %)



Source: 2011 SILC, CNB calculation
Note: Volumes of loans as of 31 December 2011. A problem loan is one that was in arrears at least once during 2011.

fourth consecutive year, rising to 69.6% (from 64.7% at the end of 2011).[19] The financial asset structure remained almost the same in 2012 as in the previous year. Currency and deposits remained the dominant financial instrument, accounting for 54.5% of financial assets at the end of 2012. An increase in the share of government savings bonds from 2.0% to 3.3% represents a minor change in structure.

The share of low-income households with loans is higher if the number of household members is taken into account

FSR 2011/2012 presented the relationship between the share of households with loans and the income quintile, showing that the share of households with loans increases relatively strongly as a function of income. However, the definition of household income can also take into account the number of household members (or consumption units as defined by the OECD), as a larger number of household members implies higher necessary expenditure. As an alternative, therefore, this Report divides households into income quintiles based not only on the absolute net income of the entire household, but also on net income per consumption unit. Although this approach also leads to the conclusion that low-income households have fewer loans, the relationship between borrowing and income is less strong (see Chart II.31). In the case of consumer credit and other loans, households in the lowest-income quintile in fact borrow more often than households in the two higher quintiles. One possible explanation is that such households use consumer credit to bridge shortfalls in funds, as their income situation is even worse on average than according to the quintiles based on absolute income levels. Loans provided to this type of household are the most risky and may lead to default in the future. However, the impacts on the financial sector would be significantly dampened by the fact that the overall absolute amount of these loans is relatively low.

The financial situation of young households in and around Prague and Brno is crucial to maintaining low credit risk

Data from the Survey of Income and Living Conditions (SILC) make it possible to map the distribution of loans and credit risk by region and age category based on the share of problem loans.[20] As expected, the highest levels of credit risk were recorded in regions generally known for their high unemployment rates – Karlovy Vary, Ústí nad Labem and Liberec (shares of unemployed persons 8.0%, 10.0% and 7.4% respectively as of 31 December 2012).[21] Central Bohemia and Prague[22] are among the least risky regions (see Chart II.32). These two regions are home to a high

19 The ratio of net financial assets to GDP dropped temporarily between 2004 and 2008 owing to relatively rapid growth in financial liabilities in this period.
20 The proposed indicator is conceptually similar to the NPL ratio, but cannot be compared directly due to the different constructions of the relevant items in the SILC and in CNB statements.
21 On the other hand, the Moravia-Silesia region, which traditionally has a high unemployment rate, did not rank among the regions with a high share of problem loans.
22 A clear distinction cannot be made between these regions, as many people with permanent residence in Central Bohemia come to Prague to arrange loans and/or work in the capital.

proportion of high-income households, which traditionally have less trouble repaying their debts. A negative relationship can also be observed between the volume of loans in each region and their riskiness. This can probably be explained by the fact that high-income households have lower credit risk and the highest debts in absolute terms. From the age perspective, persons aged 24 or younger are the most risky, but the credit risk rates differ little across the other age categories (see Chart II.33). The debt level is highest in the 30–39 age category. The SILC data show that keeping credit risk low among households aged 30–39 in and around Prague and Brno, which have relatively high wages and currently low unemployment, is essential to maintaining the sector's financial stability in the future. The situation in this household segment is crucial given the dominant share of these households' liabilities in the sector's total debt.[23]

Other variables besides age and place of permanent residence affect credit risk

Besides age and place of permanent residence, the SILC data file contains other socio-demographic household characteristics which can be used to identify households with an increased probability of default. For the purposes of this analysis, binary variables were created, taking values of either 1 or 0 depending on whether or not a pre-defined criterion is fulfilled (see Table II.1). This type of variable gives rise to results that are easy to interpret. Fulfilment of the condition defined by the division criterion in Table II.1 implies a higher probability of default. The last column contains the Gini coefficient, which indicates how well the variable separates households in arrears from those who repay on time. A Gini coefficient of 0% means a zero ability of the variable to help distinguish defaulting households from the rest, while a Gini coefficient of 100% means an absolute ability of the variable to separate the two groups. The results show that net household income is the most suitable variable for identifying households unable to repay their debts. Ownership of the property in which the household lives and the level of education of the head of household are also strong predictors of repayment problems. On the other hand, it is clear that the age of the head of household is not a very good indicator of loan repayment problems. Households whose head is younger than 25 have a very high risk of default, but their share in total households with loans is very low.[24] It is also apparent that no variable alone has a very high ability to predict (explain) loan default.

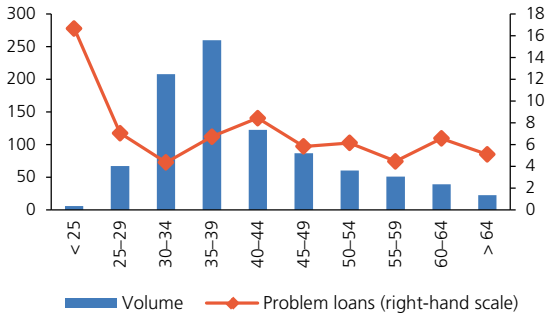
Household credit risk increased only slightly

From the perspective of the 12-month default rate, household credit risk was almost flat in 2012 (see Chart II.34) in both the loans for house purchase and consumer credit segments. The NPL ratio in the loans for

CHART II.33

Loans to households by age category and credit risk

(CZK billions; share of problem loans in %)



Source: 2011 SILC, CNB calculation
Note: Volumes of loans as of 31 December 2011. A problem loan is one that was in arrears at least once during 2011.

TABLE II.1

Importance of binary variables for household credit risk

Variable	Division Criterion	Gini coefficient (%)
Net household income	< 21,000 CZK/month	27.5
Owner-occupied property	NO	23.4
Education of head of household	No school leaving certificate	20.0
Existence of partner	Head of household has no partner	19.8
Gender of head of household	Head of household is a woman	15.6
Region of residence	Not Prague, Central Bohemia, Pardubice, Vysočina	12.1
Employment of head of household	Head of household is unemployed	11.6
Employment of partner	Partner is unemployed	8.6
Age of head of household	< 25	2.3

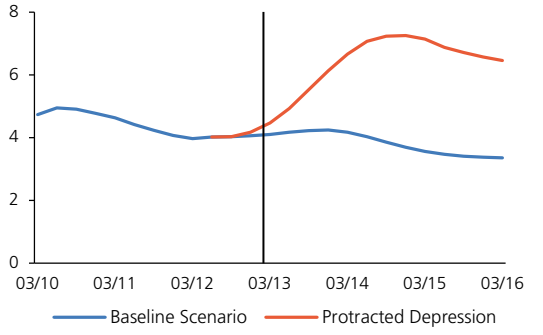
Source: 2011 SILC, CNB calculation
Note: Fulfilment of division criterion means higher credit risk

23 Such households account for one-half of the total loan volume.
24 The same is true for households with more than two children. These households are significantly more risky, but are too low in number to make the existence of more than two children in itself a good indicator of a household's level of risk.

CHART II.34

12-month default rate on bank loans to households

(%)

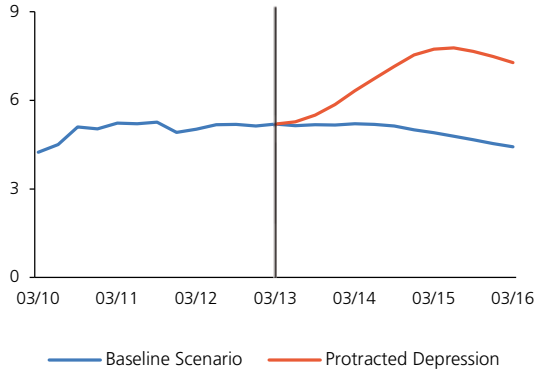


Source: BRCI, CNB

CHART II.35

NPL ratio for bank loans in the household segment

(%)

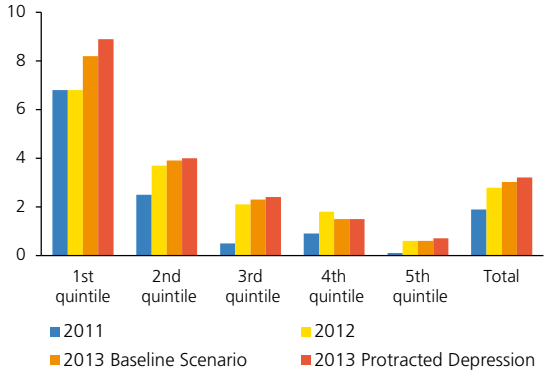


Source: CNB

CHART II.36

Shares of overindebted households by income quintile

(%)



Source: CZSO 2011 Household Budget Statistics, CNB calculation
Note: The income quintiles are based on net income per consumption unit. Consumption unit is defined according to the OECD.

house purchase segment was also almost unchanged from 2011, although in the consumer credit segment it rose by more than 1 pp. Overall, the NPL ratio for loans to households recorded a slight increase (see Chart II.35). The stabilisation of household credit risk was due largely to exceptionally low interest rates on loans for house purchase, which are the most important component of household financial liabilities. Future strong growth in interest rates coupled with subdued income growth would probably lead to a sizeable increase in household credit risk. The *Protracted Depression* stress scenario would imply a rise of almost 3 pp in both credit risk indicators.

Consumer loans are much more risky than mortgages

As of 31 March 2013, the NPL ratio for loans for house purchase was 3.5%, whereas that for consumer credit was 12.4%. For this reason, consumer credit accounted for about 44% of NPLs to households as of the same date, even though the share of this component in total household credit liabilities is only around 18%. The higher credit risk for consumer credit is reflected in interest rates (or the APRC), which are several times higher than those on loans for house purchase. This difference is larger than in advanced euro area economies. It is reasonable to assume that rather than being a case of incorrect risk valuation by Czech banks, the interest rates on consumer credit reflect its actual level of risk. In Poland and Hungary, both the interest rates and the NPL ratios for consumer credit are similar to those in the Czech Republic. Although there is some heterogeneity across consumer credit, 73.2% of consumer credit was non-specific consumer credit at the end of 2012. As a result, the NPL ratio for total consumer credit at the end of last year (12.3%) was almost identical to that for non-specific consumer credit.

Stress tests show that low-income households are the most vulnerable[25]

The stress test methodology has been further refined compared to FSR 2011/2012. The tests in this Report use the CZSO Household Budget Statistics for 2011 and have been extended to include the second adult in the household and a more detailed model of the labour market taking into account socio-demographic characteristics of individual households. The tests now also consider interest rate shocks, and a household is now defined as overindebted if it has a monthly financial surplus of less than zero korunas.

Chart II.36 shows the test results broken down by income quintile. In contrast to the aforementioned article, however, it divides households into income quintiles according to net income per consumption unit as defined by the OECD, not according to net income in absolute terms. However, the conclusions are very similar and concur that low-income households are overindebted most frequently. Overall, household

25 Preliminary results of CNB Research Project C1/11 (Hlaváč, Jakubík, Galuščák). The stress tests are discussed in more detail in the thematic article *Household Stress Tests Using Microdata* in this Report.

overindebtedness is rising and is not very sensitive to the choice of stress scenario, as the scenarios tend to represent stress from the perspective of the banking sector. Again, low-income households show the highest sensitivity to the nature of the scenario. On the other hand, the losses of the financial sector arising from the materialisation of the assumptions of the *Protracted Depression* scenario would be limited given the relatively low overall debt of these households. The results differ from the version of the stress tests used in the thematic article in that the level of overindebtedness varies less across the income quintiles than in the case of traditional income quintiles.

The rising share of mortgages with short rate fixation periods should not turn into a significant risk

As a result of the very low level of short-term interest rates, households' interest in refixing mortgages to shorter periods is rising (the share of new loans with either a floating rate or initial rate fixation of up to one year in total new loans was almost 10% at the end of 2012).[26] In addition to very low short-term interest rates, this was due to a high number of mortgages whose fixation period was ending. The scenario of a large number of households refixing their house purchase loans for a very short period (with fixation of up to one year or a floating rate) at low interest rates and then rates rising sharply poses some risk. However, the current trends may be regarded as mostly stabilising. At present, debtors generally achieve better interest rates when they refix, and the decrease in their mortgage loan servicing costs reduces their risk of default. Moreover, if interest rates were to increase gradually, banks and clients would probably adjust to the new situation and turn away from short fixation periods and floating rates. A rise in the interest rate level could have an adverse effect mainly on households whose loans have high LTV and LTI ratios (see section 5).[27]

A significant rise in defaults in reaction to an increase in the interest rate level would occur only if short-term refixations were mostly used by low-income households, which have minimal financial reserves. A combination of rapidly rising interest rates and flat nominal income, or essential household expenditure increasing at least as much as income, would have to occur at the same time. This could materialise in the event of a loss of confidence in public finance sustainability, which would lead to growth in credit premiums (and therefore interest rates) even in a situation of non-rising monetary policy rates due to adverse economic developments. The share of mortgage loans with initial rate fixation of up to one year in total mortgage loans is still relatively low (according to

26 In Austria, a full 87% of new loans to households in 2012 Q3 were provided with initial rate fixation of up to one year – see Oesterreichische Nationalbank (2012): *Financial Stability Report 24*.

27 The risks of mortgages with a variable interest rate associated with the interaction between credit and market risks are described in Breuer T., Jandacka M., Rheinberger K., Summer M. (2008): *Compounding Effects between Market and Credit Risk: The Case of Variable Rate Loans*, in Andrea Resti, ed., *The Second Pillar in Basel II and the Challenge of Economic Capital*, Risk Books.

market participants' estimates, floating-rate mortgages account for less than 5% of total mortgage loans), so the risk of this scenario materialising seems very limited so far.[28] As in the case of short-term refixation, new mortgages could in the future be more risky for households with minimal financial reserves when their initial rate fixation period expires. In order to mitigate this risk, banks should consider the historical behaviour of interest rates and not only their current low levels when evaluating the creditworthiness of current and potential clients.

28 Although this risk has been identified in several European financial stability reports, none of them identifies it as important.

3 ASSET MARKETS

3.1 THE FINANCIAL MARKETS

Global financial markets have been strongly affected by supportive central bank policies combining very low monetary policy rates with various unconventional measures. If these policies are maintained in the long term, however, they may create sources of systemic risk and foster uncertainty on financial markets. The adverse economic trend is giving rise to concerns about the financial stability of the euro area banking sector and, coupled with high public debt levels in many countries, leading to persisting uncertainty about risk transmission between the banking and government sectors. Excess demand for safe assets is pushing yields down, sometimes even into negative figures. The low yields, combined with ample liquidity, are in turn causing investors to search for yield. This is giving rise to sharp growth in stock indices and generating interest in high-quality government and corporate bonds. The demand for safe assets and the search for higher yields are also affecting the Czech government bond market and government bond yields.

Monetary policy rates at all-time lows…

The key financial markets remain under the influence of G4 central bank policies in the first half of 2013.[1] The persisting liquidity trap and the segmentation of some financial markets made these central banks further reduce their monetary policy interest rates, which are now at historical lows close to zero.[2] Monetary policy rates reached zero amid repeated episodes of stress in the debt markets of advanced countries with high government debt and amid persisting high unemployment related to the protracted recession. This gradually necessitated the introduction of unconventional monetary measures. These measures, taking the form of either longer-term liquidity provision or quantitative or targeted easing (see section 2.1), had a highly positive effect on the short-term risks to financial stability. The situation on key markets calmed and overall risk aversion decreased (see Chart III.1). The CNB's monetary policy rates are also at all-time lows in response to weak domestic demand, adverse economic developments and fiscal consolidation (see section 2). The 2W repo rate has been at the "technical zero" level of 0.05% since November 2012 (see Chart III.2).

… are leading to a further decline in money market activity…

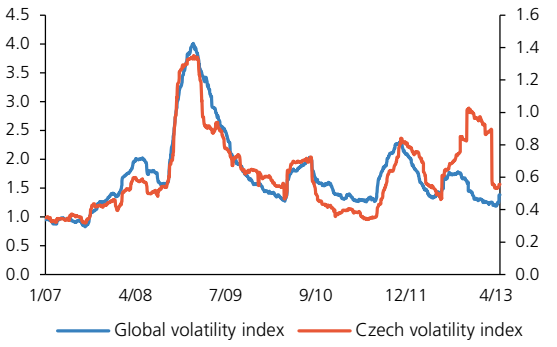
The provision of cheap, long-term liquidity in the form of a full allotment, fixed-rate tender was introduced in response to the freezing-up of interbank money markets. The liquidity crisis led to a rise in counterparty risk and a surge in the credit premium on world markets, causing market activity to fall. Central banks had to extend their liquidity

1 The G4 comprises the Bank of England (BoE), the Bank of Japan (BoJ), the European Central Bank (ECB) and the Federal Reserve System (Fed).

2 The Fed has kept its monetary policy rate in a range of 0–0.25% since January 2009 and the BoE has maintained its rate at 0.50% since March 2009. The BoJ has long held its key rate at 0–0.10%, while the ECB lowered its to 0.50% in May 2013.

CHART III.1

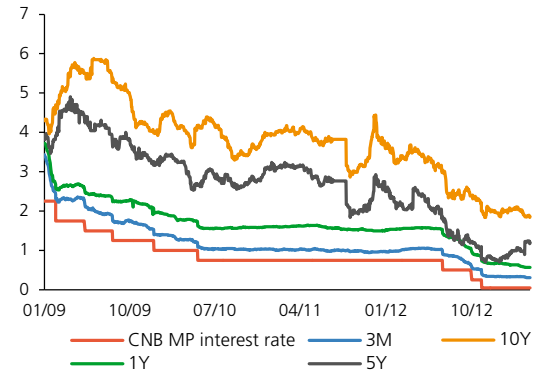
Volatility on domestic and foreign financial markets
(historical volatility over last 90 days)



Source: Thomson Reuters, CNB calculation
Note: The Czech volatility index is the sum of the historical volatility of the PX, the CZK/EUR rate, the 10Y government bond yield and the 3M PRIBOR. The global volatility index is the sum of the historical volatility of the S&P500, the DJ Stoxx50, the USD/EUR and JPY/USD rates, and 10Y DE and US government bond yields. The rise in the Czech index at the end of 2012 was caused by a decline in the 3M PRIBOR after the CNB changed its monetary policy rates.

CHART III.2

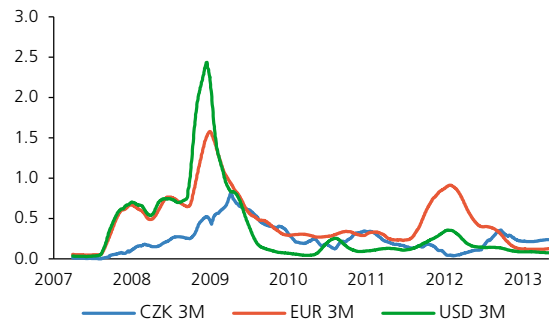
Monetary policy rate and market rates in the Czech Republic
(%)



Source: Thomson Reuters
Note: 3M and 1Y = 3-month and 1-year PRIBOR; 5Y and 10Y = 5-year and 10-year generic government bond yield.

CHART III.3

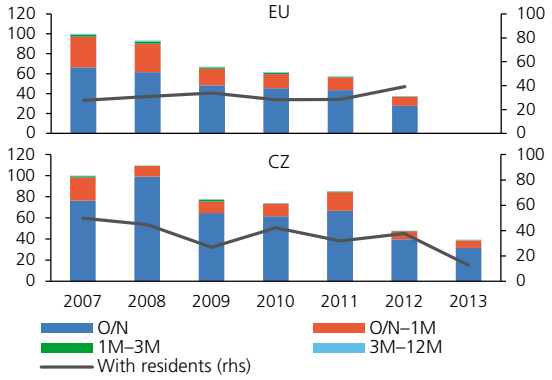
Credit premia on the interbank market
(%)



Source: Thomson Reuters, CNB calculation
Note: Difference between the 3M rate and the 3M OIS of the relevant currency. The current low activity on the interbank market is reflected in lower liquidity.

CHART III.4

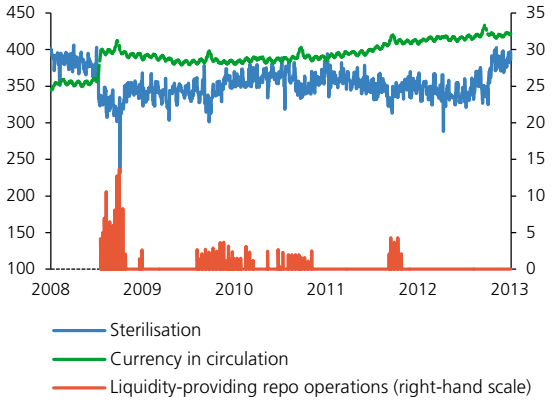
Transactions on the unsecured interbank market
(average daily turnovers; 2007 = 100)



Source: CNB, ECB, CNB calculation
Note: Data from surveys of average daily turnovers on the relevant money market. O/N = overnight, 1M = 1-month, 3M = 3-month, 12M = 12-month. The information relates to September of the given year for the EU and to October (or January in the case of 2013) for the Czech Republic.

CHART III.5

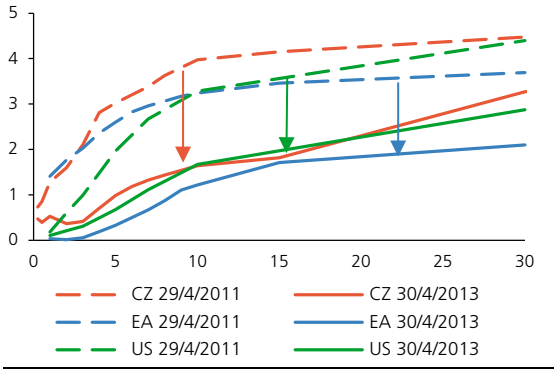
Open market operations and currency in circulation
(CZK billions)



Source: CNB
Note: Sterilisation comprises liquidity-absorbing repo operations and the CNB deposit facility.

CHART III.6

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



Source: Thomson Reuters, Bloomberg LP

provision arrangements to stabilise the money markets. This extraordinary liquidity is partially substituting for the role of the money market, so central banks are now playing a far more important role in the redistribution of banks' funds than before. The ECB eased the tensions in the euro area interbank market quite significantly by introducing three-year repo operations with full allotment (LTROs) (see Chart III.3).[3] However, the combination of a high aggregate surplus of euro liquidity and a very low market interest rate has not reduced the fragmentation on the euro money market. Given the duration of the measures introduced, the euro money market saw rather a fall in activity (see Chart III.4).[4] The persisting dependence of some banks on this extraordinary liquidity thus suggests that additional counterparty risk is probably still high. Moreover, the flat yield curve is reducing market opportunities (see Chart III.6). The lower activity and increased preference for secured transactions over unsecured ones may also be a response to the tighter regulatory requirements, which will probably lead to a reduction in the supply of unsecured interbank lending.

There is no major tension on the Czech interbank market, as evidenced by zero take-up of the extraordinary liquidity-providing repo facility (see Chart III.5). Moreover, the importance of the Czech money market has long been affected by the broad deposit base of Czech banks (see section 4). This, combined with their relatively conservative business models, makes them less dependent on market financing. Unlike most European markets, where an increasing preference for secured transactions and domestic counterparties can be seen, the Czech interbank market is still dominated by unsecured transactions, while transactions with non-residents are gradually prevailing as trading on the domestic market declines (see Chart III.4). The maturity profile reveals that O/N transactions and transactions of up to one week dominate on the unsecured market, while transactions maturing within one month dominate on the secured market.[5] Given the lowering of the 2W repo rate to the level of the discount rate, Czech banks started to make greater use of the deposit facility for depositing excess liquidity.[6] A slight upward trend in currency in circulation is also continuing. This trend is comparable to the period before the financial crisis and reflects the effect of interest rates on demand for money (see Chart III.5).

From the money market perspective, the short-term risks to financial stability have been significantly reduced by the introduction of unconventional liquidity-providing measures. However, medium-term risks persist. The unconventional liquidity-providing activities of central banks may currently be concealing some dysfunction in the money market and distorting the real level of liquidity or counterparty risk.

3 Banks were offered the option of early repayment in the first half of 2013 and repaid part of these loans on two dates.
4 Euro Money Market Survey, ECB, September 2012.
5 More information is available at http://www.cnb.cz/cs/financni_trhy/penezni_trh.
6 The ECB has a similar experience with its deposit facility (FSR, December 2012).

If these measures remain in place for an extended period, financial institutions may become dependent on them.

… and, together with unconventional instruments, to a flattening-out of yield curves…

The decline in long-term interest rates due to realised or intended government bond purchases by some central banks (the G4), along with the flight to quality and the expected persistence of monetary policy interest rates at very low levels, was reflected in a decline in the level and slope of government yield curves in some countries (see Chart III.6). A flatter yield curve is also apparent for Czech government bonds even though the CNB is not making targeted purchases of government bonds on the secondary market. This is due mainly to expectations of very low interest rates in future as well as to strong investor demand for Czech government bonds. The sustained low rates are having a positive effect, as they are reducing the costs of government debt financing and thus also the credit risk of banks' loan portfolios. At the same time, the constantly rising prices of government bonds are being reflected in higher profitability of government creditors, which are repricing the bonds in their portfolios. Nevertheless, a relatively long period of a low, flat yield curve entails additional risks. In this environment, the life insurance sector is exposed to an imbalance between the assets and liabilities sides of its balance sheet, as while investment income is continuously falling, guaranteed rates of return are changing only very slowly. The low interest rate environment may thus foster higher leverage or investment in more risky assets (see section 4).

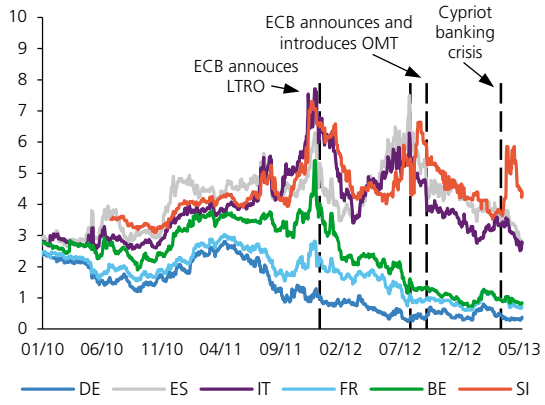
… which, supported by other policy commitments, has made government financing cheaper

After the details of the Greek debt restructuring were finalised in March 2012, the markets shifted their attention to other European countries – both to those which had already reached higher levels of government debt (e.g. Belgium and Italy) and to those whose public finances had come under pressure due to a rise in contingent liabilities stemming from a weak banking sector (Ireland, Cyprus, Slovenia and Spain; see Chart III.7). The markets' concerns about debt sustainability were reflected in some countries' risk premiums. Credit premiums in the southern periphery of Europe reached very high levels. In July 2012, yield spreads against German government bonds reached a full 719 bp in Spain and 599 bp in Italy. The surge in sovereign debt risk premiums is reflected in higher debt service costs. If investors are concerned that a government sector has a higher default risk because its high government debt is already high, they demand higher risk premiums or higher returns. However, this further increases debt service costs and causes the government sector more financing difficulties, and so the feared risk of default also increases. Investors' concerns become self-fulfilling and the risk of multiple equilibria rises. Moreover, the increase in sovereign risk feeds back into the stability of financial institutions – directly through losses on government bond holdings and higher

CHART III.7

Government bond yields in selected euro area countries

(%)

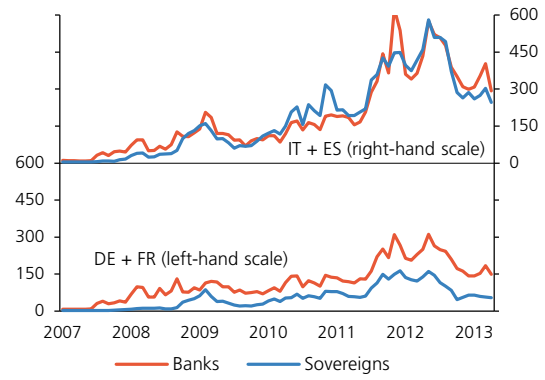


Source: Bloomberg LP
Note: 5Y generic government bonds.

CHART III.8

Government and banking sector credit risk

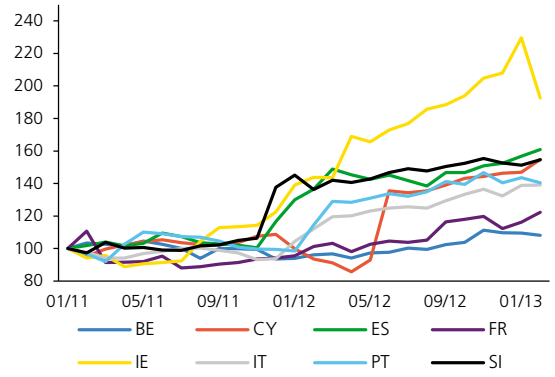
(bp)



Source: Bloomberg LP, CNB calculation
Note: The chart shows the arithmetic means of CDS on the 5Y senior debt of sovereigns and the largest banks of the countries concerned.

CHART III.9

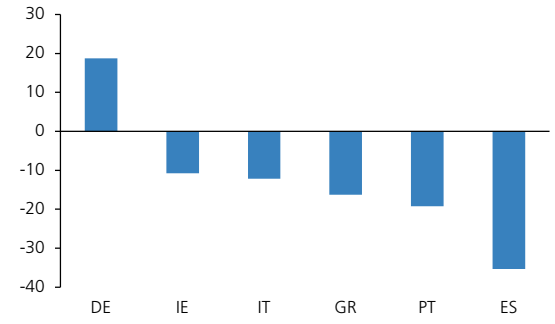
Domestic government bonds in MFI assets
(31 January 2011 = 100)



Source: ECB, CNB calculation

CHART III.10

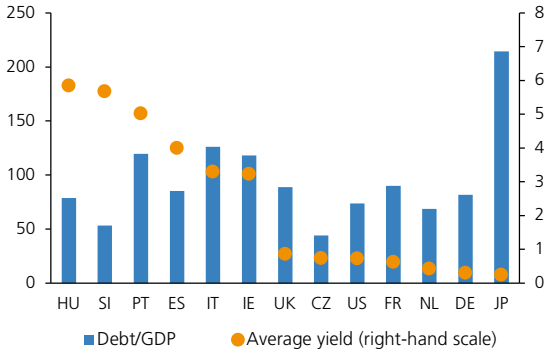
Change in foreign deposits with banks in selected euro area countries
(%)



Source: Central banks of relevant countries, CNB calculation
Note: Year-on-year change as of September 2012 (or August 2012 in the case of Italy and June 2012 in the case of Spain).

CHART III.11

Comparison of government debts and their yields for selected economies in 2012
(%)



Source: Bloomberg LP, CNB calculation
Note: Debt is expressed as a percentage of GDP as of the year-end; average yields relate to 5Y generic government bonds.

financing costs and indirectly through a change in the book value of other domestic assets. A significant relationship is thus created between the financial and government sectors (see Chart III.8).[7]

This situation forced the ECB to take unprecedented measures.[8] In particular, it introduced a new facility consisting in unlimited yet conditional purchases of government bonds on secondary markets (Outright Monetary Transactions, OMT).[9] Like the earlier LTRO, this facility led to a large decline in sovereign risk premiums (see Chart III.7). Some risk might arise in connection with this programme if it were to disappoint the currently high market expectations. The launch of the European Stability Mechanism (ESM) also later helped reduce tensions.[10] It was used for the first time in December 2012, when Spain received EUR 39 billion to restructure its banking sector.

Despite a decline in aggregate liquidity risk, sovereign credit risk persists in the euro area…

The liquidity risk of the government sector fell significantly, partly because of the home bias effect (see Chart III.9).[11] However, fundamentals (the debt level, primary deficits, the economic outlook, funding maturity and balance-sheet recession in the banking sector) will continue to dominate, reducing the effectiveness of the measures introduced. Government bond market developments will depend mainly on compliance with current commitments at the euro area level (the establishment of the banking union) and at the country level (compliance with the promised fiscal consolidation). The banking union, which envisages single banking regulation and supervision, a common system for bank resolution and a common deposit guarantee scheme (see Box 1 in section 4), is expected to help reduce the risk of an outflow of deposits (see Chart III.10) and significantly weaken the link between the sovereign and banking sectors of individual countries (see Chart III.9).[12] However, these expectations may prove to be over-optimistic (see Box 2 in section 5).

… although markets assess the relative rather than the absolute level of government debt

The evolution of government bond yields shows that there is no safe absolute threshold for debt sustainability as perceived and priced by

7 See the thematic article Fiscal Sustainability and Financial Stability in this Report.
8 The markets responded strongly to the very announcement of the new rescue mechanism in July 2012, when ECB President Mario Draghi stated: "Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough." (http://www.ecb.int/press/key/date/2012/html/sp120726.en.html).
9 The launch and execution of OMTs is conditional on the participation of the issuing state in the ESM/EFSF programme and full compliance with its conditions. The purchases will focus on government bonds with a maturity of one to three years.
10 Contrary to initial plans, the ESM was not launched until September 2012, after it had been ratified by the German Constitutional Court. For detailed information about the ESM, see FSR 2011/2012 and www.esm.europa.eu.
11 Domestic financial institutions' preference for domestic government bonds is narrowing the relationship between the government and financial sectors. This is increasing the risk of moral hazard, as manifested by expectations of the two sectors that they will be able to rely on assistance from the central bank should any difficulties arise.
12 See http://www.imf.org/external/pubs/ft/sdn/2013/sdn1301.pdf.

markets. The safe level of debt is relative and markets incorporate the government's ability to manage debt in the long run into the sovereign credit premium. Economic fundamentals and contingent liability estimates have a dominant position. However, the important factors also include the nature of the creditor base (domestic or foreign, banks or institutional investors), the time structure of the maturity of the debt and the currency in which the debt is issued. The government's ability and opportunity to influence money issuance also plays an important role. These facts are reflected in the demands of investors, who require a much higher risk premium for holding Italian or Spanish bonds than, say, British or Japanese bonds even though Spain's debt stands at 85% of GDP and Italy's at 127% of GDP, while the UK and Japan have debt of 88% and 214% of GDP respectively (see Chart III.11).

The calming of markets is fragile, with persisting fragmentation…

Although European markets have calmed, they remain fragmented (see Chart III.7). The possible reasons for this include differences in the real economy and differences in lending to corporations, which may be a result of a potential lack of capital and higher credit risk due to declining economic activity. Fragmentation is also being fostered by persisting uncertainty about the sufficiency of the lending capacity of the EFSF/ESM rescue mechanism and by the behaviour of investors, who on the one hand are seeking safe assets and on the other hand are looking for opportunities to achieve returns in an environment of sustained low rates.

… and concerns about contagion

Market instability resurfaced in Europe in connection with the assistance programme for Cyprus in the first half of 2013. The resolution plan for the Cypriot financial sector, which contained a bail-in tool, got the markets moving for a while, albeit in a more controlled manner (in a persisting environment of excess liquidity) than in previous assistance episodes. The original programme, taking the form of a progressive tax on all deposits, came as a great surprise to the markets. It remains unclear whether the bail-in can be used to resolve financial sector stability problems in other countries and what impact it might have on the functioning of the banking union. The markets are also concerned about the implementation of capital controls in Cyprus. The main risk is associated with the movement of capital after these controls are lifted. The Cyprus crisis also drew attention to the problems of smaller economies with relatively large financial sectors. Yields on Slovenian government bonds recorded a particularly strong response (see Chart III.7). The problems of Cyprus, like the earlier crisis in Iceland, show how difficult it is to resolve a banking sector crisis using domestic public budgets if the size of the banking sector significantly exceeds the output of the economy (see Chart III.12).

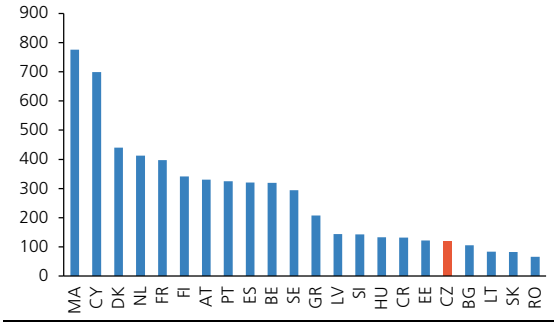
Demand for safe assets is pushing yields to low or even negative levels…

Some regulations currently under preparation (e.g. liquidity standards and the requirement to settle contracts via central counterparties), the quantitative easing and fixed exchange rate policies of some central

CHART III.12

Ratios of MFI assets to GDP in selected countries

(end-2011, %)

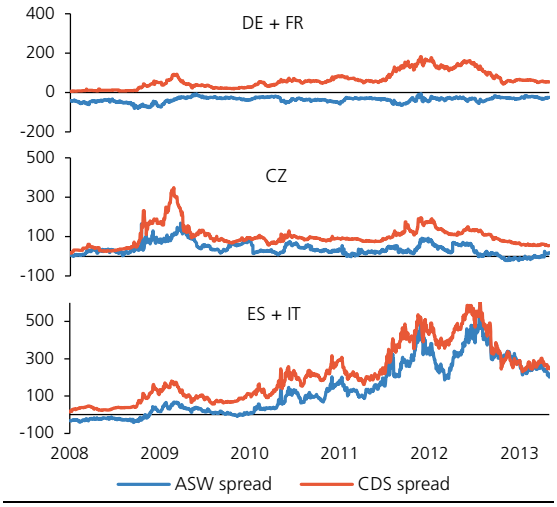


Source: Eurostat

CHART III.13

Credit premiums on the government bond and sovereign CDS markets

(bp)



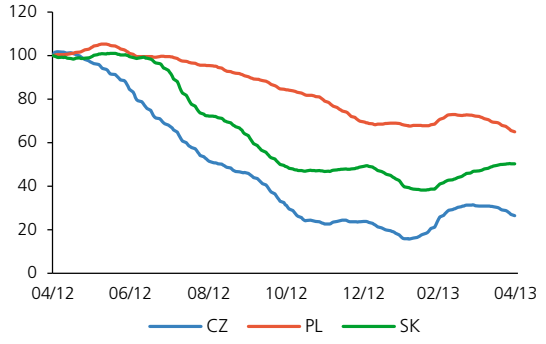
Source: Bloomberg LP, CNB calculation

Note: The credit premium on the bond market is calculated as the 5Y ASW spread, i.e. as the difference between the 5Y government bond yield and the 5Y IRS.

CHART III.14

Government bond yields for selected central European countries

(monthly average spreads vis-à-vis German bund; 30 April 2012 = 100)

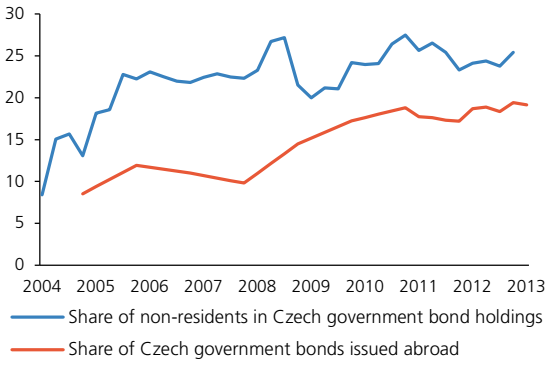


Source: Thomson Reuters, CNB calculation

Note: Yield spreads between the 5Y benchmark government bonds of the relevant countries and the German bund.

CHART III.15

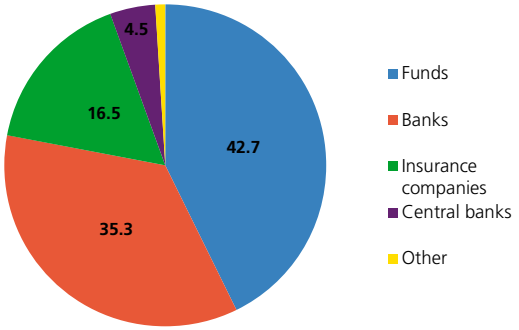
Czech government debt issued/held abroad
(%)



Source: MF CR, CNB
Note: The share of Czech government bonds issued abroad is calculated on the basis of nominal values. For this time series, the quarterly data up to and including 2010 are estimated from yearly data.

CHART III.16

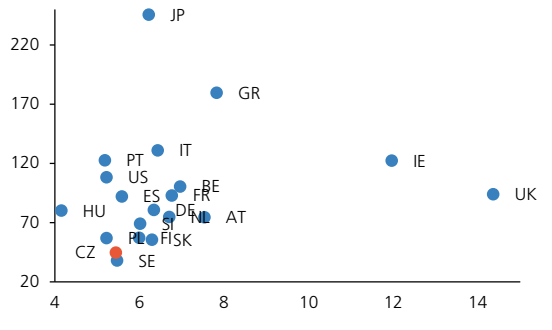
Breakdown of foreign investors investing in Czech eurobonds on the primary market
(%)



Source: MF CR, CNB calculation
Note: Weighted average for the two most recent issues (24 February 2012 and 5 October 2012).

CHART III.17

Average maturity versus debt level
(x-axis: average maturity in years; y-axis: ratio of government debt to GDP in %; end-2012)



Source: Bloomberg LP, IMF

banks, the migration of investors from unsecured to secured markets due to concerns about counterparty risk, and the increased aversion of some conservative investors in response to future economic developments are significantly increasing demand for safe assets and depressing income on such assets to low or negative levels. The correlation between the risk premium and yields on government bonds of countries with the highest ratings has been negative since the start of the debt crisis, since, as a result of the downward pressure on long-term interest rates and the search for quality, prices of safe assets have been diverging from fundamentals reflecting their real risk premium (see Chart III.13).[13] In response to this anomaly, new imbalances may arise in the form of excessively high (artificially created) market prices of other assets (e.g. corporate bonds or government bonds of other countries; see Charts III.14 and III.19), as the yield curve of the selected safe assets might start to be used as a benchmark for the pricing of other assets. If the distorted asset prices derived from this benchmark start to align, it could have very adverse consequences. If economic conditions necessitate the withdrawal of unconventional monetary stimuli, medium-term risks to financial stability may also emerge in connection with the holding of safe assets in central banks' balance sheets, i.e. the robustness of safe asset status may come into question. In such an event, the markets may expect central banks not only to stop purchasing safe assets, but also to start selling them. Such expectations could result in a sharp adjustment of prices of benchmark assets with a negative impact on prices of other assets.

… and Czech government bonds are also recording falling yields…

Czech government bond yields have also reached all-time lows (see Chart III.2). The government yield curve is flattening out as a result of stronger demand for domestic bonds. This is due to a relatively low debt-GDP ratio (see Chart III.12), government fiscal consolidation efforts as well as a lack of alternatives for investment in Czech korunas. Domestic investors are showing constantly high interest in Czech bonds (see section 4). However, Czech bonds are also becoming increasingly popular abroad, as can be seen from the interest in issues of euro-denominated Czech government bonds (see Chart III.15). The foreign investors demanding Czech bonds are most often financial institutions from core euro area countries and from Central and Eastern European countries (see Chart III.16).

… but the market price may decline in the future

Government bonds of other Central European countries are also enjoying strong investor interest, as reflected in narrower yield spreads vis-à-vis the German bund (see Chart III.14). The fall in yields is often explained by the

13 Under normal conditions, the correlation between the yield on a government bond and the sovereign CDS spread of the same maturity is positive, as in both cases their movements reflect the sovereign default risk. If sovereign risk increases, the government bond yield and the price of hedging should both rise. A negative relationship suggests barriers to arbitrage and an anomaly in one of the markets. High demand for these high-quality assets, especially among foreign investors, increases interest in hedging against default risk. For this reason, prices of hedging (the CDS spread) go up and the asset yield (the government bond yield) goes down, hence the correlation is negative (see Chart III.13).

assumption that central banks will hold short-term rates at very low levels for an extended period of time. However, Czech government bond yields have declined much more significantly for the most frequent maturities (i.e. over 1 year and up to 5 years – see section 4) than can be explained by this factor alone. At the same time, this sharp fall cannot be explained by including Czech government bonds among safe assets. Unlike in Germany, the looser relationship between Czech government bond yields and the relevant CDS seems to be due not to a search for "Czech quality", but rather to the above-mentioned opportunity to invest free funds in more profitable assets with a currently low default risk (see Charts III.11 and III.2).[14] This situation could change quite quickly. Moreover, since the Czech government bond market is not very liquid, the adjustment of prices would not necessarily be linked with a change in the phase of the cycle. It could be caused by a mere change in the investment strategy of a single large bank that usually purchases government bonds. This situation could result in herd behaviour. In the event of mass sell-offs, the yields demanded could rise sharply and the government sector could run into liquidity difficulties. Although the risk of multiple equilibria is more relevant to the case of high debt, it cannot be ruled out even if the debt level is lower. This risk is higher for debt with a shorter average maturity (see Chart III.17), since the larger is the debt to be refinanced in a given year, the more likely it is that current investors will be concerned about future refinancing. This may make them unwilling to refinance the debt now.

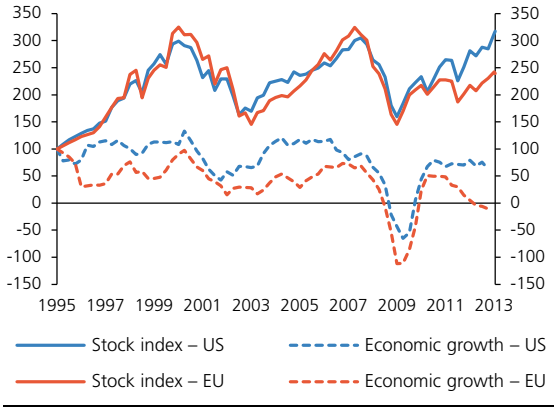
Global stock markets have been recording sharp growth

The environment of very low interest rates is also affecting the stock markets. In addition to investors seeking higher yields, the demand for shares may be due to corporations taking advantage of the opportunity of low debt financing costs to purchase shares. Here too, however, mixed trends can be observed across countries and continents (see Chart III.18). Besides the reasons given above, shares on US markets are enjoying growth on the back of good news from the real economy. Financial issues even regained their pre-crisis levels for the first time in March 2013. By contrast, financial issues in Europe (which are currently at around 40% of their pre-crisis levels) are causing significantly slower growth in stock indices. Moreover, the markets for these shares are showing high volatility, reflecting the uncertainty about banking sector stability and the potential resurgence of the debt crisis. This is confirmed by a fall in bank shares connected with the Cyprus crisis and the uncertainty about taxation of deposits. Investor confidence in this sector is also being affected by uncertainty regarding the form and timing of the planned regulatory changes, such as the introduction of a financial transaction tax.[15]

CHART III.18

World stock markets and the business cycle

(1995 Q1 = 100)

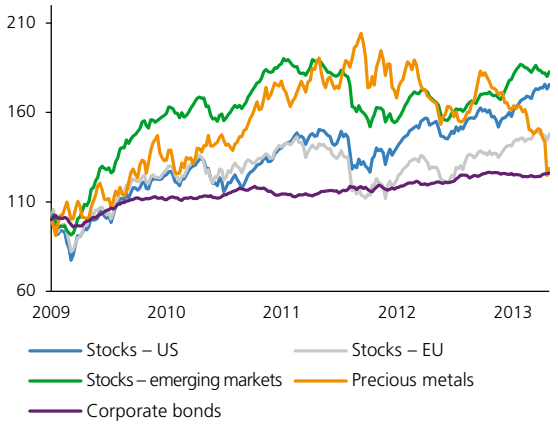


Source: Bloomberg LP, CNB calculation
Note: For the stock index, the S&P 500 was used for the USA and DJ STOXX Europe was used for Europe.

CHART III.19

Main stock, bond and precious metal indices

(2 January 2009 = 100)



Source: Bloomberg LP, Thomson Reuters, CNB calculation

14 At the same time, the different trends in the CDS credit premium and the underlying bond are associated with differences in the structure of participants in the two markets (see Box 4 of FSR 2011/2012).

15 Eleven EU countries are expected to introduce a financial transaction tax in 2014: Belgium, Estonia, France, Italy, Germany, Portugal, Slovakia, Slovenia, Spain, Austria and Greece.

3.2 THE PROPERTY MARKET

Property prices declined further in 2012, in some property categories for the fourth consecutive year. The number of real estate market transactions fell accordingly. The price decline was in line with fundamentals and was similar to that seen in economies comparable to the Czech Republic. From the regional perspective the trends are very mixed, with prices in Prague falling more slowly than in the rest of the Czech Republic, or even rising slightly. Likewise, the number of transactions in Prague is rising, in line with a recovery in residential development sales. However, the overall financial situation in the property development sector remains unfavourable, with the NPL ratio staying at high levels or increasing even further according to some calculations. Along with other estimates, the property price sustainability indicators, which improved further during 2012 thanks to the price decline mentioned above, suggest that property prices are slightly undervalued. Given the outlooks for their fundamentals, though, apartment prices are expected to stagnate or decline slightly in the period ahead and might start rising in mid-2014. However, property prices are subject to considerable – mostly downside – risks.

Property prices continued the downward trend observed in previous years…

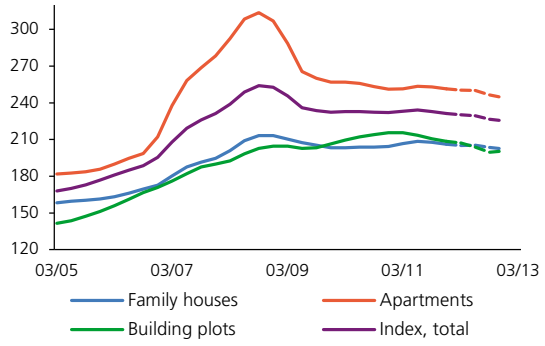
Czech property prices continued the downward trend observed in previous years across all categories in 2012 (see Chart III.20). Transaction prices of apartments fell the most (by 2.9% year on year as of the year-end) and are now about 22% down from the peak recorded in late 2008. Prices of family houses, which are the most stable of all, reversed the slight increase observed in 2011 and declined by 1.8% year on year. They are now 5% below their peak. Prices of building plots, which had previously been the only category to maintain growth during the financial crisis, also fell in 2012. Building plot prices calculated from available asking prices decreased by 3.7% year on year in 2012 and are 6.9% below their 2011 Q1 peak.[16] The decline in property prices deepened slightly overall in 2012. Apartment prices were around 2.4% lower than assumed in the *Baseline Scenario* of FSR 2011/2012. This was due mainly to the worse-than-expected evolution of economic activity, which caused the risks of lower property prices highlighted in FSR 2011/2012 to materialise.

… but price developments were mixed across regions

The apartment price data, for which there are multiple alternative sources for various regions, indicate that the price dynamics were fairly mixed. While apartment prices in Prague recorded slower declines and even

CHART III.20

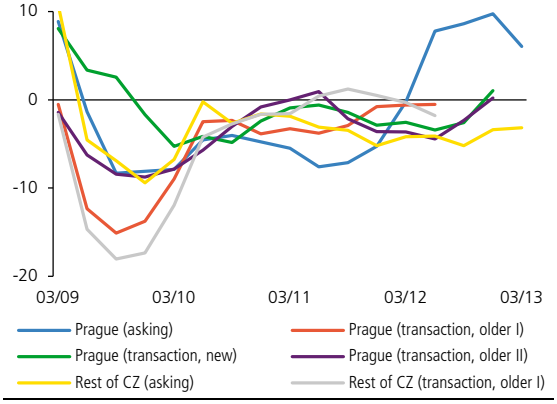
Property prices – transaction prices
(absolute index; 1999 Q1 = 100)



Source: CZSO, HB index, CNB calculation
Note: The data for family houses and apartments for 2012 H1 are preliminary data. The other data for 2012/2013 are calculated from alternative sources of data on transaction prices (HB index, etc.).

CHART III.21

Property prices according to the CZSO – transaction prices and asking prices
(year-on-year indices; %)



Source: CZSO
Note: The data on apartment transaction prices come from two independent sources – property tax returns ("older I") and a CZSO survey of estate agencies ("older II" and "new").

16 Based on alternative indicators of building plot transaction prices according to the HB index (see http://www.hyposvet.cz/hb-index/), these prices continued to rise in 2012 (by 6.4%) However, the HB index data are available in a relatively short time series (only since 2010) with no detailed regional breakdown. Building plot prices based on this source have not been very closely correlated with other sources of data in the past either.

switched to annual growth[17] for some types of property, the decline in prices for the Czech Republic outside Prague deepened further (see Chart III.21). A comparison of prices of new and older ("used") apartments in Prague also shows that prices of new apartments, which fell only gradually in response to the lower demand in the initial phases of the financial crisis, saw similar decreases in 2011–2012 as prices of older apartments, probably in response to slow sales. Moreover, anecdotal evidence for 2012 suggests a "price war" between major developers in some parts of Prague. This was reflected in the overall index for Prague, albeit only partially (the historical weights), and in at least a partial stimulation of the apartment market in Prague.

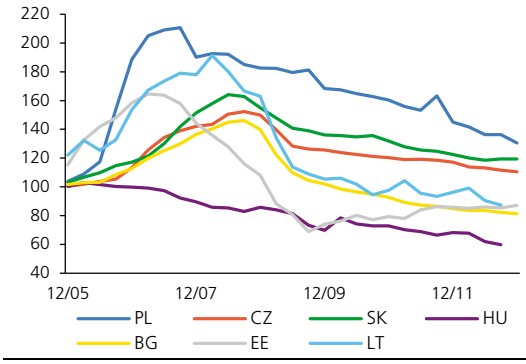
Apartment prices in the Czech Republic are similar to those in other comparable countries

Property prices in the Czech Republic were essentially in line with those abroad (see Charts III.22 and III.23). Like in the Czech Republic (which recorded a decline of 5.6%), real apartment prices fell in most EU countries with a similar level of economic development. In some countries (Poland, Hungary, Slovenia, Romania and Lithuania) the declines were bigger in real terms than those the Czech Republic, while in others (Portugal, Bulgaria, Slovakia and Latvia) they were smaller. The only comparable country to show price growth was Estonia, although this represented a correction of the massive property price decline of almost 60% recorded in 2007–2008. Overall, the variation across the said countries can be well explained by their different economic and labour market situations.

In advanced countries, property prices remained very mixed. Real property prices declined further in countries with a high level of sovereign risk (in addition to the aforementioned Portugal, prices fell by 12.8% in Spain, 13.2% in Greece and 6.2% in Ireland), whereas in some countries that had seen significant downward corrections in recent years prices stabilised or even started rising last year (in the USA, for example, property prices went up by 6.4%). Prices also continued to go up in some countries that had previously been showing subdued price growth (by 6.3% in Austria, by 3.4% in Germany and by 3.9% in Switzerland), reaching relatively high levels. This raises the question of whether this is due to a search for yield and whether such prices are overvalued. Despite some minor price declines, the possibility of property price overvaluation also persists in countries in which the price declines in recent years have not yet fully offset the fast pre-crisis growth (e.g. France, Belgium and Sweden).

CHART III.22

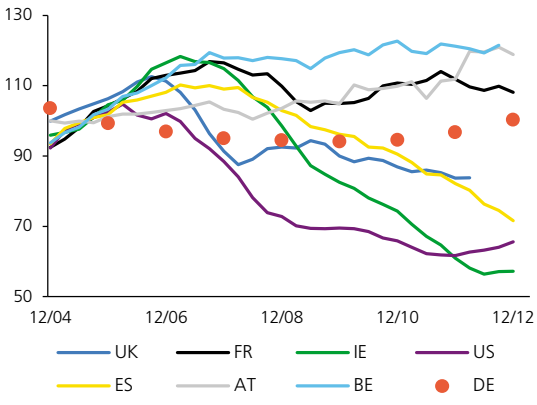
Property prices – international comparison, selected EU countries
(prices in real terms; absolute index; 2005 average = 100)



Source: BIS, national statistical offices and central banks

CHART III.23

Property prices – international comparison, advanced countries
(prices in real terms; absolute index; 2005 average = 100)

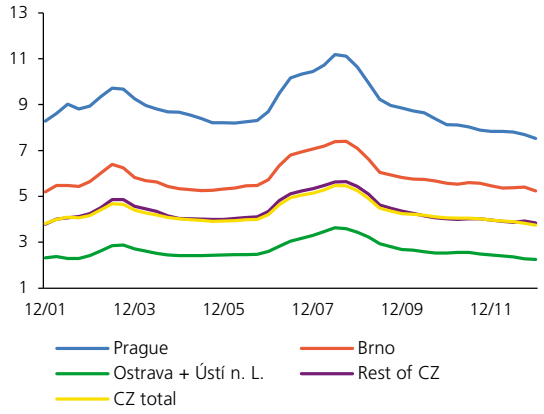


Source: BIS, Nationwide (UK), national statistical offices

17 Nevertheless, the relatively sharp growth in asking prices of apartments in Prague, which reached almost 10% at the end of 2012 according to the CZSO, is not too conclusive, as it is not consistent with alternative sources of asking price data. According to the IRI, for example, asking prices in Prague were down by 4.3% year on year at the end of 2012.

CHART III.24

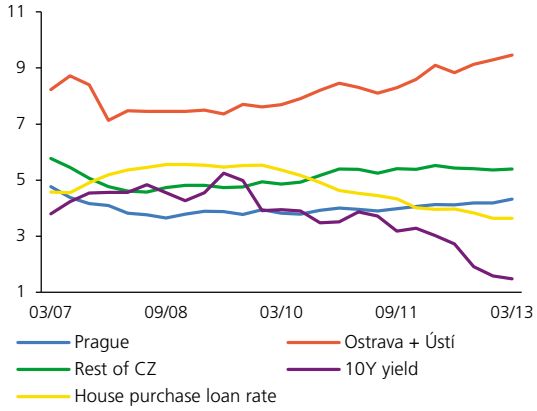
Price-to-income ratios
(ratio of price of 68 m² apartment to moving sum of wage over last four quarters)



Source: CZSO, CNB calculation
Note: 2012 data preliminary or calculated from asking prices.

CHART III.25

Apartment rental returns
(averages for period in %; 2003–2006 yearly data, then quarterly)



Source: IRI, CNB
Note: Comparison with 10Y government bond yields and rates on new house purchase loans.

Property price sustainability indicators improved in the Czech Republic

The property price sustainability indicators improved again in 2012 and are indicating that property prices are rather undervalued. The price-to-income ratios for most regions fell below the levels of the period before the latest price growth and are close to historical lows (see Chart III.24). The price-to-income ratio is now down by more than 31% from its mid-2008 peak. The 5.4% year-on-year drop in the ratio was driven mainly by the decline in property prices and may also be partly due to a one-off increase in wages at the end of 2012 due to tax reasons.[18] The ratio thus suggests a further improvement in housing affordability. However, significant regional differences persist, as it takes Prague households roughly twice as long to earn enough money for a typical flat as it does households in the Czech Republic as a whole.

Rental returns increased further in 2012 (rising by 2.1%, or 0.1 pp, on average year on year for the Czech Republic at the end of 2013 Q1; see Chart III.25), despite declines in both government bond yields and interest on house purchase loans (of 1.5 pp and 0.3 pp respectively). Rental returns were thus well above the return on speculative assets and the cost of debt financing of housing for all regions. On the one hand, the high rental returns (for most regions the highest in 5.5 years) suggest low downward pressures on property prices, but on the other hand they open up even more space for speculative property purchases. An increased proportion of real estate purchases as financial investment is also indicated by stylised facts published by developers themselves.[19] Investment in real estate is usually viewed by investors as low-risk and as protection against inflation. This type of investment is also currently being fostered by falling mortgage rates, the elevated saving rate of households (related to provision for old age), a relative shortage of rental accommodation and the perceived undervaluation of apartment prices. However, as mentioned below, the risks of a deterioration in the fundamentals affecting property prices remain high. The longer-term demographic scenarios are also depressing property prices.

The overall decline in property prices in 2012 was in line with fundamentals. As in previous years, prices were affected mainly by developments on the labour market. The general unemployment rate increased by around 0.6 pp in 2012 and the number of vacancies declined by 2.5% year on year. Very low growth in nominal wages was observed for most of the year and real wages fell (for details see section 2.3 or the CNB's *Inflation Report*). The demographic determinants of property prices also worsened. Natural population growth dropped further. It is now almost at zero, the lowest level in seven years. Although population growth due to migration remains

18 Average wages showed a surprising large rise of 3.7% in nominal terms in 2012 Q4. However, this rise was largely due to a sharp increase in extraordinary bonuses paid to the best-paid employees, as some corporations took the opportunity at the end of 2012 to pay extraordinary bonuses to their managers in advance for tax reasons.
19 For example, according to an Ekospol client survey, the proportion of apartments purchased for investment purposes increased from 10.8% to 24.1% in 2012.

positive (at around 1 person per 1,000), it declined by 39% year on year and is at its lowest level since 2002.[20] The regional differences in property price growth are also well explained by demographic factors, with population growth being driven almost entirely by growth in Prague and the surrounding region of Central Bohemia.

Although the decline in property prices in recent years can largely be explained by deteriorating determinants, part of it remains unexplained. This fact is reflected in "statistical" undervaluation of property prices according to most of the methods considered (see Chart III.26). However, this can be attributed to the backward-looking nature of the methods applied. Given the expected macroeconomic developments and the deterioration in the financial situation of households, the *Baseline Scenario* continues to assume flat or slightly falling apartment prices, although they could begin to rise in mid-2014 (see Chart III.27). However, this scenario is subject to considerable – mostly downside – risks. The risk of potential worse macroeconomic developments is illustrated in the *Protracted Depression* stress scenario, in which property prices drop further by around 17% in 2013–2014. In addition, foreclosures affecting overindebted households and developers remain a downside risk to prices, despite better progress with sales of apartments in property development projects. Property prices are likely to remain mixed in the future. The emergence of a short-term speculative bubble is not ruled out in regions where purchases of property for investment (Prague in particular) are more prevalent. This bubble may also emerge "from below", with property prices stagnating or increasing only slightly amid worsening fundamentals.

Transaction numbers were also mixed across regions

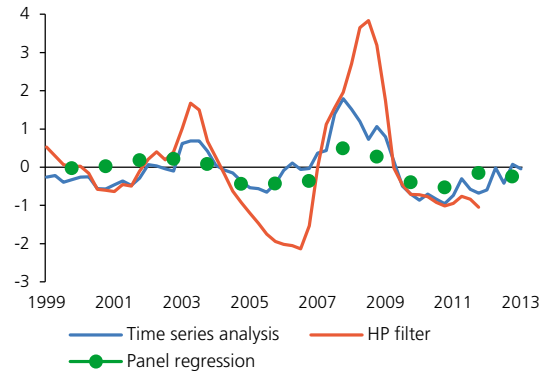
The overall decline in the number of property market transactions continued into 2012 (see Chart III.28) in terms of both the number of entries of records of title to houses and apartments in the cadastre (down by 10.9% year on year) and the number of apartment starts (down by 13.4%), which is the lowest in 15 years. The number of apartment completions increased (by 3%), causing the number of apartments under construction to fall, but it remains very low as well. The number of new mortgages for house purchase and the average mortgage amount fell in 2013 Q1 from the high levels observed last year (by 3.1% and 2.8% year on year respectively). However, the number of property market transactions confirms the "two-speed" property market hypothesis, as the number of entries of records of title to houses and apartments in the cadastre dropped by a sizeable 15.7% in the Czech Republic outside Prague and Central Bohemia for 2012 as a whole (Source: COSMC), while rising by 5.4% in Prague. Similarly, Prague also recorded higher growth in the number of apartment completions (15.6% year on year, and a sizeable 26.6% for apartments in apartment blocks) and a smaller decline in the number of apartment starts (3.2% year on year). The recovery in demand for new apartments in development projects

20 Compared to its peak in 2007, population growth due to migration is at around 12%.

CHART III.26

Apartment price gaps in the Czech Republic – deviations of actual prices from estimates

(CZK thousands per m²; positive values: overvaluation, negative values: undervaluation)

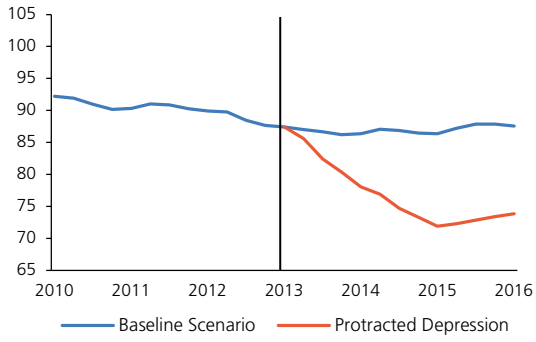


Source: CZSO, CNB calculation (WP 12/2009)

CHART III.27

Property price index according to different scenarios

(2007 Q4 = 100)

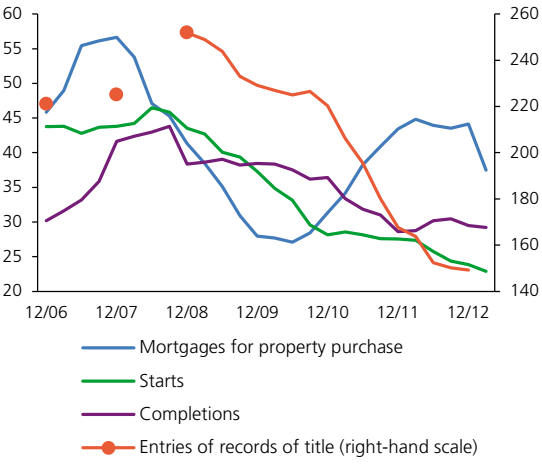


Source: CNB

CHART III.28

Numbers of transactions on the property market

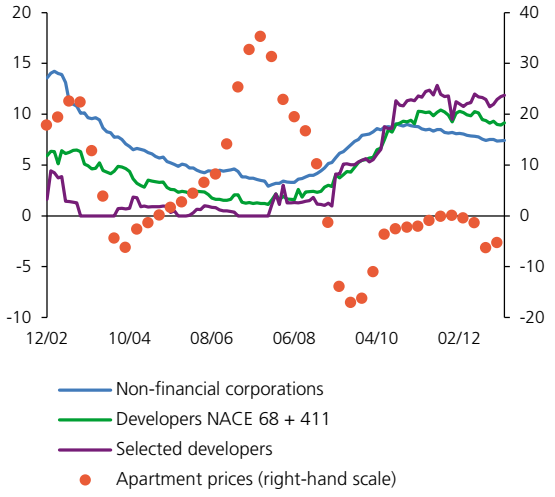
(thousands of transactions; moving sums over past year)



Source: CZSO, COSMC, FINCENTRUM HYPOINDEX
Note: Entries of records of title to buildings and apartments only.

CHART III.29

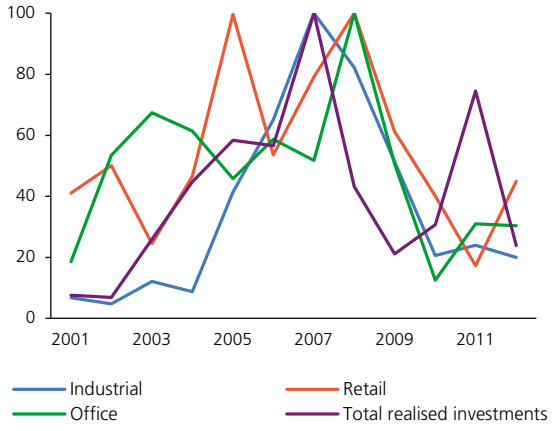
NPL ratios in the property development sector
(%; year-on-year growth for apartment prices)



Source: CZSO, CNB

CHART III.30

Planned supply and realised demand on the commercial property market
(maximum = 100)



Source: Jones Lang LaSalle
Note: Supply of industrial and retail property calculated from new supply in m² for the Czech Republic as a whole and supply of office property in m² for Prague; realised investments from data in EUR. Maximum for office and retail property for 2008 and for industrial property and investments for 2007.

in Prague is confirmed by developers' data indicating a rise in the number of apartments sold in 2012 as a whole.[21] The recovery continued into the start of 2013, with the number of unsold completed apartments also recording a decline.

The NPL ratio for developers remains high

Despite some recovery in demand and renewed progress with the sale of apartments in development projects,[22] the overall financial situation of developers is not very favourable. While the NPL ratio in the non-financial corporations sector was declining during the year (by 0.8 pp since the end of 2011), the NPL ratio in the property development sector has been flat at high levels and for a group of selected developers has in fact risen further (by 2.3 pp since the end of 2011; see Chart III.29[23]) The CCR data also suggest that banks monitor potentially risky customers for longer on average than in the past before categorising developer loans as NPLs (see Chart II.23). In 2007–2008, the average monitoring period for loans ultimately classified as NPLs had been around 3.5 months, whereas in 2011 it was 8.8 months on average and in 2012 it was 9.7 months. As with the entire non-financial corporations sector (see section 2.2), this may reflect on the one hand more prudential behaviour by banks, but on the other hand a softening of the credit conditions and an increase in forbearance. In any event it is clear that the level of risk associated with the current situation in the sector remains elevated for property development projects.

Following a significant recovery in 2011, investment activity in the commercial property segment fell sharply again in 2012 (by almost two-thirds) and is now only just above the level recorded in 2009, when property prices fell the fastest (see Chart III.30). Office property transactions accounted for 63% of the total volume of transactions. However, the supply of office buildings recorded a year-on-year decline of 2.2%, while the new supply of industrial property fell by 16.7%. By contrast, supply in the retail segment increased sharply (to 2.6 times the level recorded in 2011). The total gross take-up in the office property sector (the total rental stock) in 2012 remained close to the high levels seen in 2011 (recording a year-on-year decline of 16%). The share of renegotiations rose by 12.2 pp year on year to 43%. As a result, net take-up dropped more significantly (by 38.6% year on year), but it

21 According to Ekospol, the number of apartments sold in development projects rose by 16.2% to 4,014 in 2012; Trigema reported an increase of 20.8% to 4,578 and Skanska a rise of 2.5% to 4,720. According to the COSMC, however, the total number of apartment transfers (i.e. including older apartments) was one order of magnitude higher at almost 38,000.

22 Before the onset of the financial crisis, almost 95% of all the apartments in a typical development were sold prior to completion, whereas in 2011 the figure fell to 54%. In 2012, it picked up again to 63%. At the same time, however, marked differences in the success of individual property development projects persist, with customers differentiating more between developments according to quality and price.

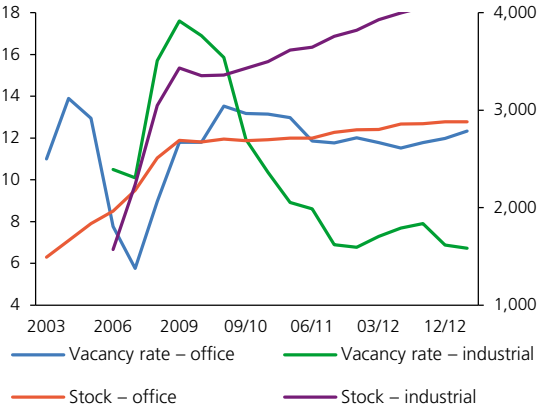
23 The NPL ratio for developers in Chart III.29 is calculated in two ways; both use the CNB's Central Credit Register as the source of data. The first method is based on selected (the largest) developers and related companies (about 1,300 entities). The second series shows loans granted to all corporations in the categories "Real estate activities" (NACE 68) and "Development of building projects" (NACE 411). Owners' associations and housing cooperatives were excluded.

remains positive and roughly at the average level of the last five years. Take-up also rose in the industrial property segment (gross take-up increased by 8.9% and net take-up by 26%). The recovery in take-up was reflected in a rise in prices and a related year-on-year drop in yields on office property of 0.4 pp. However, given the even bigger fall in the returns on alternative assets, the question remains whether the partial improvement reflects a search for yields regardless of the domestic economic situation. This could lead to an overheating of the market and an increase in the vacancy rate, as observed for office property in 2012 (see Chart III.31).

CHART III.31

Total stock and vacancy rates

(vacancy rate in %; stock in thousands of m² on right-hand scale; 2003–2009 yearly data, then quarterly)



Source: Jones Lang LaSalle, Prague Research Forum

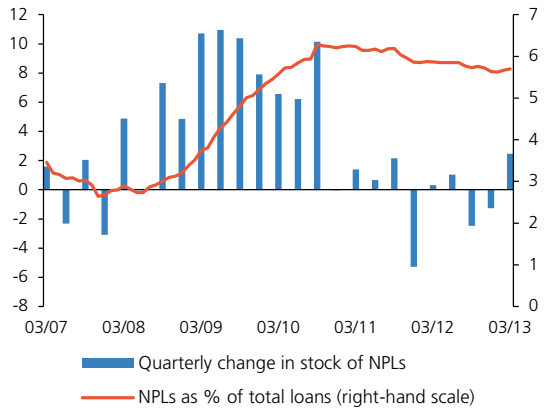
4 THE FINANCIAL SECTOR

4.1 DEVELOPMENTS IN THE FINANCIAL SECTOR

Despite the contraction in economic activity, 2012 was a positive year for the Czech financial sector. The banking sector still has sufficient capital adequacy, profitability and liquidity. Similarly, insurance companies are recording solid capitalisation and rising profits. The equity of the pension fund sector strengthened and collective investment funds switched from previous losses to profits. The main risks to the financial sector stem from a continuing economic slowdown leading to a rise in credit risk and a potential decline in banking sector profitability. Although aggregate indicators of the banking sector indicate a year-on-year increase in its resilience, the differences across institutions increased and some institutions could thus be less resilient to adverse developments. The situation in the credit union segment, where risk indicators are rising, remains unsatisfactory, with some institutions exhibiting low prudence in their business activities.

CHART IV.1

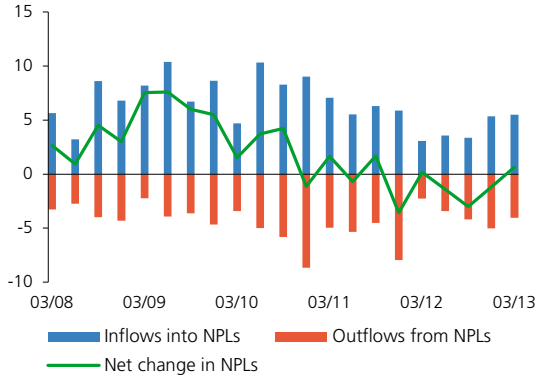
NPLs in the Czech banking sector
(CZK billions, %; client loans to residents)



Source: CNB

CHART IV.2

Decomposition of corporate NPL flows
(CZK billions; client loans to residents)



Source: CNB

The financial sector's assets rose in 2012 despite the contraction of the real economy

The adverse trend in the real economy in 2012 was reflected in a smaller year-on-year rise in the balance-sheet of the financial sector. Compared to 2011, when the percentage growth in assets was largest in the banking sector and the credit union segment, 2012 saw an increase in assets across all segments except non-bank financial corporations engaged in lending (NFCELs), which, as in previous years, are losing market share. The banking sector is still the most significant segment of the financial sector in terms of asset size, with a share of more than 77% of total assets (see line FS.2 in the *Table of Indicators*).

After a decline, credit risk started rising again in the banking sector

Credit risk in banks' balance-sheets, as expressed by the ratio of non-performing loans (NPLs) to total loans to residents, continued to follow the gradual downward trend of the last two years and stood at 5.7% in March 2013 (see Chart IV.1). Non-financial corporations and households recorded opposite movements, however. The NPL ratio in the non-financial corporations sector fell from 8.2% to 7.4% year on year, whereas that in the household sector edged up from 4.9% to 5.1% (see line BS.30 in the *Table of Indicators*).[1]

The decline in NPLs in non-financial corporations during 2012 was due not only to a fall in new defaults (i.e. a lower default rate) compared to

1 Besides the above trends in the resident sector, corporate loans to non-residents recorded a sharp increase in NPLs (of CZK 5.5 billion) in the last quarter of 2012. However, this was caused by the one-off classification of several large claims and is therefore not linked with any systemic rise in the risk of loans provided to non-residents, which account for less than 10% of total loans granted.

the previous period, but also to a rising outflow of NPLs caused by write-offs of loans from banks' balance sheets or reclassification of the original loans back to performing loans (see Chart IV.2).[2] In 2012 Q4, however, new defaults rose again compared to the figures for 2012 as a whole, and in the *Baseline Scenario* the default rate should remain elevated in the following year in both the household and non-financial corporations sectors (see Section 2).

Migration of NPLs to the loss category continues

Within NPLs, the share of loans that are not actually past due is decreasing and the proportion of all loans that are more than three months past due is rising (see Table IV.1). This suggests a lower probability of due repayment of loans, or at least part of them, in the future. The gradual migration of NPLs to the loss loan category continues, as predicted in FSR 2011/2012. This category accounted for more than 58% of total NPLs at the end of 2012.[3] In addition, according to transition matrix estimates, this migration should continue in 2013 (see Chart IV.3). This could lead to a need for additional provisioning, with adverse knock-on effects on banks' profitability.[4]

Prudential NPL coverage by provisions is decreasing…

Although the coverage of NPLs by provisions remains at around 50% as in previous years, the number of banks below this average level increased in 2012. Some of them are exhibiting a risky combination of a below-average coverage ratio and a high NPL ratio (see Chart IV.4). The question is thus whether – given this fact and the aforementioned continuing migration of NPLs to loss loans – the coverage level is still sufficiently prudent. Some divergence between the actual and required NPL coverage ratios, as calculated at the aggregate level using the coefficient method, also suggests some doubts (see Chart IV.5).[5] Although the required coverage ratio set in this manner takes into account the structure of NPLs (including migration to the loss loan category), it does not reflect collateral quality, which has an important role in provisioning and can reduce the need for it. From the aggregate perspective, however, a lack of improvement in collateralisation of NPLs can be seen, and the proportion of sufficiently collateralised NPLs in fact

TABLE IV.1

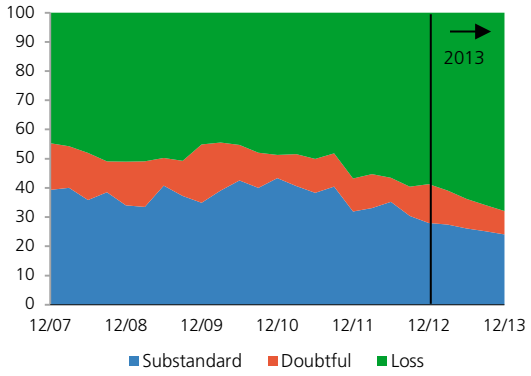
Structure of NPLs
(%)

	Sufficiently collateralised loans to households and corporations	Fully non-collateralised loans to households and corporations	Share of collateralised	NPLs, total
2009	31.0	32.5	36.5	100.0
2010	35.1	31.5	33.4	100.0
2011	36.8	30.6	32.6	100.0
2012	35.4	29.4	35.1	100.0
	Substandard	**Doubtful**	**Loss**	**NPLs, total**
2009	37.4	21.1	41.4	100.0
2010	39.2	13.4	47.4	100.0
2011	32.6	14.0	53.5	100.0
2012	27.1	14.3	58.6	100.0
	Not past due	**Up to 3M past due**	**More than 3M past due**	**NPLs, total**
2009	52.4	9.2	38.4	100.0
2010	51.6	9.9	38.5	100.0
2011	46.1	9.4	44.5	100.0
2012	43.7	9.5	46.8	100.0

Source: CNB, CNB calculation
Note: Note: Sufficiently 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.).

CHART IV.3

Structure of NPLs and 2013 forecast based on the *Baseline Scenario*
(%)

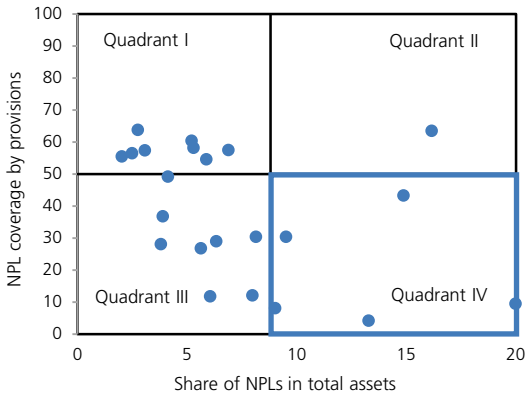


Source: CNB

2 The analysis was conducted on data from the Central Credit Register, which covers the corporate sector only. Data for households are not available for this type of analysis.
3 NPLs are classified as substandard, doubtful and loss according to their worsening quality.
4 Implied loan migrations were obtained by estimating a transition matrix of non-financial corporations in the Central Credit Register and linking it with macroeconomic data based on the official CNB forecast. For more information, see Wei, Z. J. (2003): *A Multi-Factor, Credit Migration Model for Sovereign and Corporate Debts*, Journal of International Money and Finance, No. 22, pp. 709–735, and Otani, A., Shiratsuka, S., Tsurui, R., Yamada, T. (2009): *Macro Stress-Testing on the Loan Portfolio of Japanese Banks*, Bank of Japan Working Paper Series, No. 9.
5 Under Article 201 of Decree No. 123/2007, 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 collateral value related to NPLs.

CHART IV.4

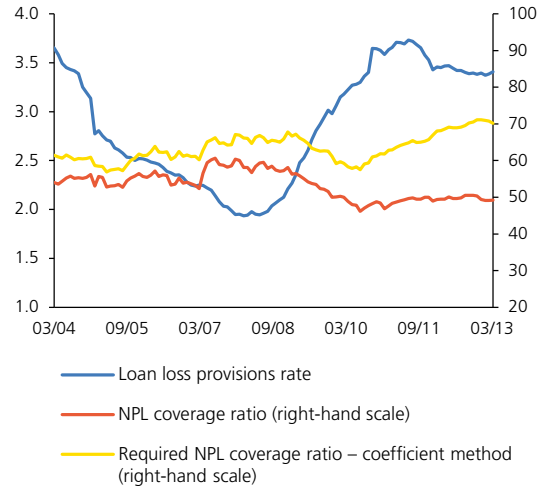
NPL coverage
(%; client loans; as of 31 December 2012)



Source: CNB
Note: Banks excluding branches of foreign banks. The boundaries of the quadrants were chosen as the average NPL coverage ratio in the sector and as the 75th quantile NPL ratio in the sector, which equals 8.8%.

CHART IV.5

Provisions and coverage of NPLs by provisions
(%)



Source: CNB

decreased year on year (see Table IV.1). The aggregate level of collateral on loans for house purchase does not indicate a rising value of collateral last year either (see section 5.5).

… and differences in coverage levels across banks are increasing

To take into account any difference in the level of collateralisation of NPLs when estimating coverage sufficiency, an analysis of coverage sufficiency was conducted at the level of individual banks using loss given default (LGD) values for various credit segments.[6] The results show that the difference between the actual and required coverage ratios rose slightly on average between 2011 and 2012 (from 8.4 pp to 9.4 pp), but the dispersion between banks and the number of banks with insufficient NPL coverage both increased (see Chart IV.6).

Data obtained from surveys of selected banks at the start of 2013 regarding NPL recovery rates indicate that the baseline LGD values used for the analysis of coverage sufficiency are set conservatively across credit segments and banks have in recent years been recording higher recovery rates than those corresponding to the LGD values considered. Nonetheless, in some cases, the expected LGD values for default claims for which the recovery process has yet to be completed are higher and more in line with the elevated LGD levels in the coverage sufficiency analysis. The current NPL coverage for these elevated LGD values thus may truly be insufficient for some banks (see Chart IV.6, right-hand panel).[7]

Credit risk can alternatively be examined using the ratio of impaired loans…

Impaired loans, i.e. loans whose book value has been reduced due to credit risk, represent an alternative measure of credit risk to the traditional NPL indicator. Whereas NPLs de facto indicate the quality of the bank's debtors, impaired loans also take collateral into account and are thus expected to show losses even after collateral is considered.[8] The degree of impairment, i.e. the expected loss, is expressed by the provisions created for such loans. The ratio of impaired loans to total

6 This analysis is based on a comparison of the actual coverage ratio and the required coverage ratio, which should cover NPL losses. The required coverage was calculated as the product of the LGD values and the volume of NPLs in the main credit segments (loans to non-financial corporations, loans for house purchase, consumer credit and other loans). The baseline LGD values for the individual portfolio categories were identical to the values reported by banks in the joint stress testing exercise. For other banks (excluding foreign bank branches) which did not participate in this exercise, the averages for the participating banks were used. The LGD values applied in 2012 were 39.4% for loans to non-financial corporations, 20.7% for house purchase loans, 44.7% for consumer credit and 39.9% for other loans. The calculated average required coverage ratio for the baseline LGD values was 35.2% for 2011 and 33.9% for 2012.

7 The overall sum of defaulted exposures in 2008–2012 with completed and uncompleted recovery is similar across most credit segments. In the case of newer defaults, the amount of defaulted exposures with uncompleted recovery is rising.

8 Loans that are fully collateralised need not be labelled as impaired loans because the bank will be fully satisfied from the collateral in the event of a reduction in the debtor's credit quality. Impairment of such loans can occur only in the event of simultaneous decreases in the debtor's quality and in the value of the collateral or the quality of the collateral provider (e.g. the guarantor).

loans can be used to identify credit risk in the consolidated banking sector, for which the traditionally used NPL ratio is not available.

… which is indicating higher credit risk for the banking sector on a consolidated basis

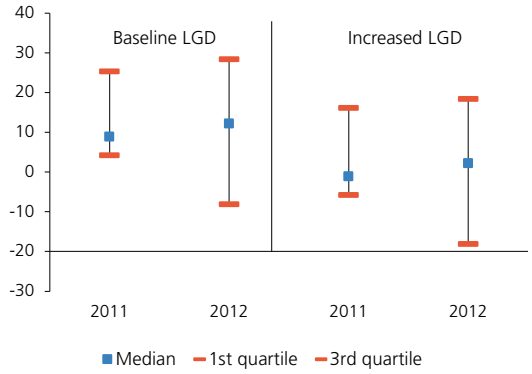
At the end of 2012, the ratio of impaired loans to total client loans for the banking sector on a solo basis was 8.5%, thus exceeding the NPL ratio by 2.5 pp (see Chart IV.7). However, the dynamics of the two indicators have been similar in recent years. The higher value of impaired loans compared to NPLs is partly due to the fact that impaired loans also include loans classified as watch loans and in some cases also those classified as standard loans, and neither of these categories is a component of NPLs.[9] If other financial institutions forming a regulated consolidated group (RCG)[10] with the reporting bank are included, the share of impaired loans on a consolidated basis increases to 9.7%, indicating higher credit risk in the balance sheets of financial corporations within RCGs compared to the credit risk of banks on a solo basis.

The credit risk associated with off-balance-sheet items increased slightly and may not be sufficiently covered by reserves

The economic contraction in 2012 was also reflected in the banking sector's off-balance-sheet transactions, which for banks also represent exposures associated with credit risk. Guarantees to legal entities and individual entrepreneurs fell moderately to CZK 209 billion at the end of 2012, while the volume of "risky" guarantees, i.e. guarantees given by a bank to clients who get into default,[11] rose by CZK 0.6 billion year on year to CZK 4.9 billion (see Chart IV.8). If this risk were to materialise in full, the reserves of CZK 4.4 billion would not be sufficient to cover the losses on these risky guarantees.[12] Moreover, the analytical concept of risky guarantees may underestimate the risks to some extent, as risky guarantees as defined exclude risky clients that did not have bank loans in the given period.

CHART IV.6

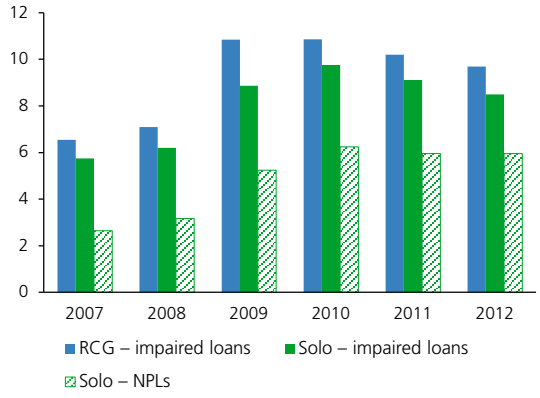
Differences between actual and required level of NPL coverage by provisions
(pp; for the additional stress 10 pp was added to the LGD)



Source: CNB

CHART IV.7

Quality of client loans on a consolidated (RCG) and solo basis
(as % of total client loans)



Source: CNB
Note: RCG = regulated consolidated group.

9 Standard loans can increase the amount of impaired loans if a bank uses the portfolio approach to assessing impairment for a part of its loan portfolio. Claims on sectors that are developing adversely can serve as an example. Provisions can be created for these claims as a whole even though the individual claims have yet to show any signs of impairment, are being duly repaid, and are therefore classed as standard.

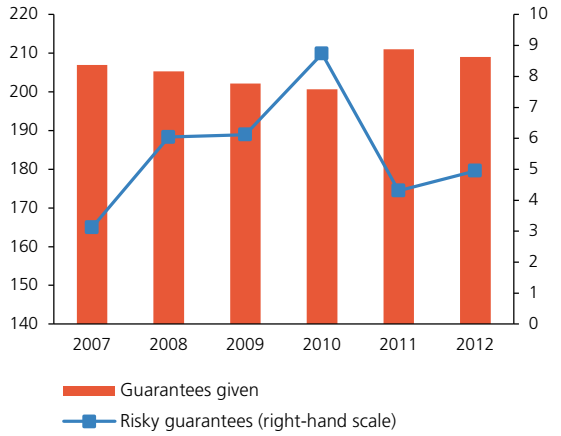
10 In addition to a parent bank group, a financial holding entity group or a mixed-activity holding entity group can be a consolidated group. A consolidated group consists of a parent undertaking and its subsidiaries and affiliates. A regulated consolidated group (RCG) is a consolidated group exclusive mainly of non-financial entities (including ancillary services undertakings), insurance and reinsurance companies and affiliates that are not jointly managed ventures. An RCG is thus a subset of a consolidated group and is subject to the prudential rules (see Act No. 21/1992 Coll., on Banks, and Decree No. 123/2007 Coll., on prudential rules for banks, credit unions and investment firms).

11 Risky guarantees are defined as volume of guarantees given to clients who have non-performing loans with the given bank or another bank Besides the probability of having to honour a guarantee to a third party, the bank's expected loss from the resulting balance-sheet claim on the client also increases in the case of such guarantees if the payment under the guarantee was due to bankruptcy of the client (see also FSR 2011/2012, pp. 63–64).

12 This means the amount of reserves created for loan commitments and guarantees given. Information about reserves for guarantees given only is not currently available at the aggregate level.

CHART IV.8

Risky guarantees
(CZK billions; legal entities and individual entrepreneurs)



Source: CNB
Note: Risky guarantees = volume of guarantees given to clients who have non-performing loans with the given bank or another bank.

CHART IV.9

Changes in assets and risk-weighted assets of selected Czech banks and their parents
(pp; change between end-2010 and end-2012)

Source: Bankscope, banks' mandatory information disclosures

The capital adequacy of banks may increase as a result of risk weight optimisation…

Risk weights and risk-weighted assets (RWAs) are important pieces of information in the assessment of the riskiness of banks' portfolios.[13] The EBA recommendation to increase the capital of European banks to 9% of Core Tier 1 by June 2012 sparked a debate at the European level about the extent to which banks will employ RWA optimisation (i.e. adjustment of the risk profile of their portfolios) to achieve a higher capital adequacy ratio. RWA optimisation comes in two forms: "desirable" and "undesirable". In the context of capital adequacy increases, moving assets to less risky activities can be regarded as "desirable". The main "undesirable" form of RWA optimisation is the recalibration of existing models for calculating risk parameters to reduce RWAs without a corresponding reduction in the real riskiness of the portfolio.

… which may have occurred in some Czech banks…

At the aggregate level, the overall risk weights in the Czech Republic decreased from 44.8% at the end of 2010 to 42.2% at the end of 2012.[14] For some banks, this may have been motivated by their parent banks, which had to increase their capital adequacy ratios in the wake of the EBA recommendation. A comparison of five selected Czech banks and their parent companies in the area of RWAs and total assets between the end of 2010 and the end of 2012 indicates such a link (see Chart IV.9). In that period, the risk weights – calculated as the ratio of risk-weighted assets to total assets – either decreased or were unchanged in all the Czech banks and their parents under review. The asset growth in banks 1, 2 and 3 was accompanied by at least a partial increase in RWAs, while banks 4 and 5 saw a decline in RWAs despite growth in assets. In addition, the dynamics of both RWAs and total assets in the latter two banks do not differ qualitatively from those of their parent banks, which were striving to increase their capital adequacy ratios to comply with the EBA recommendation.

… but the impacts of undesirable optimisation of risk weights by domestic banks are limited

A comparison of the risk weights of Czech banks reveals that they differ widely from bank to bank, even within relatively homogeneous credit segments.[15] These differences can be explained by the different strategies of different banks, as represented, for example, by a preference for selected market segments, by average loan size or by loan maturity. However, the models chosen and the data used to estimate risk

13 Risk weights are defined as the ratio of risk-weighted assets (RWAs) to exposure at default (EAD). Total assets were used as a proxy for EAD to simplify the analysis.
14 Around half of this decrease was caused by growth in the share of exposures to government bonds with a zero risk weight.
15 Estimates were made on a sample of banks with a total market share of more than 86% of the credit market. Large, small and medium-sized enterprises and specialised credit exposures were studied in the corporate portfolio, and sole traders, loans for house purchase, consumer credit and other loans were analysed in the household sector.

parameters in the IRB regime, and thus the bank's search for a "more favourable" model calibration (i.e. "undesirable" RWA optimisation), may also play a role.

To assess the impact of potential "undesirable" RWA optimisation, the current capital adequacy of the individual banks was estimated using the (higher) risk weights as of the end of 2010, i.e. the period before capital was increased in line with the EBA recommendation. The capital adequacy ratio calculated in this way would be 14.9% for the sector as a whole and would thus be only 1.6 pp lower than the current level. This suggests that even if some Czech banks were to engage in undesirable RWA optimisation, it would have only minor impacts on the capital adequacy of the banking sector as a whole.

The concentration of government bonds in banks' balance sheets is increasing

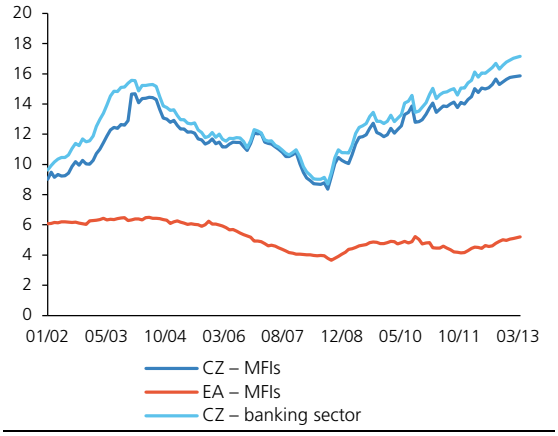
The share of Czech government bonds in the banking sector's balance sheets continued to rise in 2012 – from 15.1% in 2011 to 16.8% in 2012. These values far exceed the figure for the euro area, where government bonds issued by euro area countries accounted for 5% of the balance sheet of monetary financial institutions excluding central banks at the end of 2012 (see Chart IV.10). Domestic banks are motivated to hold resident government bonds by the current regulations governing the calculation of capital adequacy and by the option of using these securities as collateral in the CNB's liquidity-providing repo operations in the event of a liquidity shortage. The concentration of domestic banks' portfolios on the government as a debtor is continuing to strengthen the links between the banking and government sectors (the Czech banking sector holds about 44% of total government debt) and may strengthen the relationship between financial and fiscal stability in the Czech Republic (see the thematic article *Fiscal Sustainability and Financial Stability* in this Report). Possible adverse fiscal policy developments in the future might influence the pricing of Czech government debt by investors and negatively affect banks with higher concentrations of Czech government bonds in their portfolios.

The banking sector has sufficient capital adequacy and high-quality capital

The Czech banking sector currently has around CZK 320 billion of total regulatory capital at its disposal (its capital adequacy ratio was 16.4% in 2013 Q1). It is also ready for the introduction of the new CRD IV capital regulations, as all banks are compliant with the minimum Tier 1 capital ratio of 8%, which for the Czech banking sector is essentially the same as the new Common Equity Tier 1 capital requirement (see Chart IV.11). However, it is essential in the current situation that banks maintain a sufficient capital buffer against possible future adverse developments stemming from the still elevated risk level and the deteriorating prospects for profitability. Once the CRD IV rules are approved, it will be possible to further enhance the banking sector's capital adequacy in the years ahead by using capital buffers derived from the systemic importance of the bank in the domestic sector (see the thematic article *An Additional Capital Requirement Based on the*

CHART IV.10

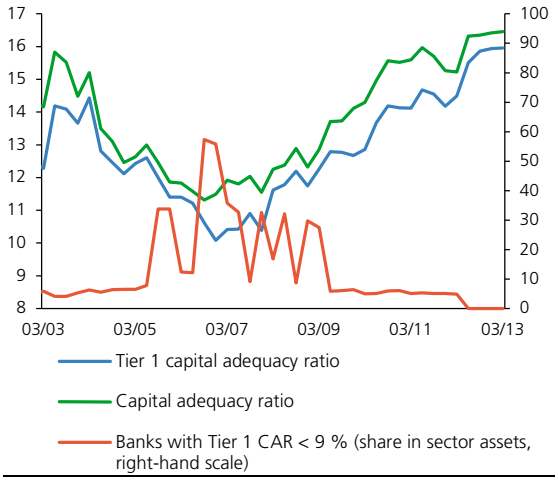
Share of bonds issued by domestic governments in the balance sheet of MFIs excluding central banks
(%; MFIs excluding central banks comprise credit institutions and money market funds)



Source: CNB, ECB

CHART IV.11

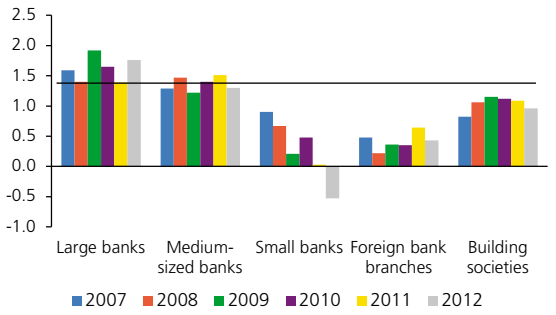
Capital adequacy
(%)



Source: CNB
Note: Assets of sector = assets of banks excluding branches of foreign banks.

CHART IV.12

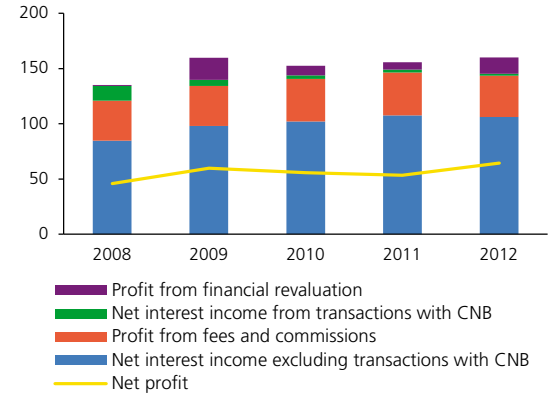
Return on assets (RoA)
(%)



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 2012.

CHART IV.13

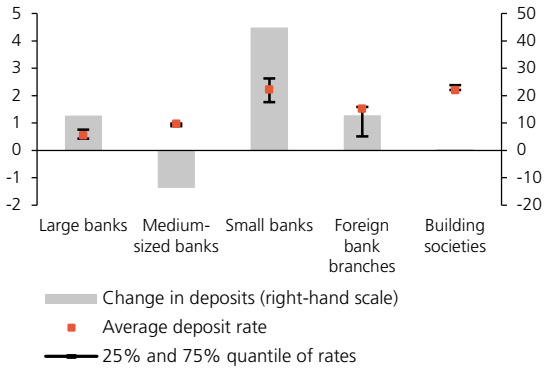
Key components of profit from financial activities
(CZK billions)



Source: CNB

CHART IV.14

Changes in household deposits in 2012 and average interest rates
(rates in %; deposits in CZK billions)



Source: CNB
Note: Bank size classification by asset size as of 31 December 2011.

Domestic Systemic Importance of a Bank in this Report) or by setting a countercyclical capital buffer (see section 5.4).

Although the profitability of the banking sector remains high…

The profitability of the banking sector in terms of RoA remains high and significantly exceeds the euro area average (1.4% versus 0.02% at the end of 2012). Nevertheless, there are large differences across the segments of the banking sector. Large and medium-sized banks show higher profitability, while foreign bank branches and small banks show the lowest. The small banks segment recorded an RoA of -0.5% in 2012 (see Chart IV.12). The low performance of these segments (in terms of RoA) is partly due to the entry of new institutions onto the domestic banking market, as these newcomers generally face higher initial costs and higher fund-raising costs than established banks.

… it can be expected to decline in the years ahead

The banking sector's net profit of CZK 64 billion for 2012 represents a year-on-year rise of CZK 11 billion (see Chart IV.13). This rise was due to profits from revaluation and especially to base effects, as some banks had recognised the impairment of Greek bonds in 2011. Net of this effect, the banking sector would have shown no major year-on-year changes in profitability. By contrast, the main components of profit – interest profit and profit from fees and commissions – recorded year-on-year (albeit slight) declines for the first time since the start of the crisis. This decline can be expected to continue in the years ahead owing to falling interest rate margins due to increasing competition on the bank loans and deposits market and also due to falling payment-intermediation profits amid declining economic activity. The *Baseline Scenario* expects interest profit to decline by around 5% year on year over the scenario horizon.

The banking sector is facing growing competition on the deposit market, whose volume expanded …

The decline in the banking sector's profitability is also linked with the entry of new banks competing for client deposits. The average interest rate offered by small banks is around 1.5% higher than that offered by large and medium-sized banks. As a result, small banks managed to increase the amount of household deposits they received by almost CZK 45 billion during 2012 (see Chart IV.14). Total deposits of households in the Czech banking sector rose by almost CZK 56 billion in 2012. The client deposits of all residents increased by around CZK 192 billion year on year.

… and further improved the sector's liquidity indicators

The banking sector has long had a good liquidity position, with a large excess of stable client deposits over client loans (see Chart IV.15). Given the above-mentioned year-on-year growth in deposits, the ratio of client deposits to client loans also increased – from 126% in 2011 to 132% in 2012. This further improved the sector's liquidity indicators. The excess of deposits over loans is enabling banks to create a buffer of quick assets, which made up 29% of banking sector assets at the end of 2013 and could be used if a liquidity shock were to occur. The liquidity buffer

consists mainly of cash and claims on the CNB, claims on banks repayable on demand, and Czech government bonds.

The Czech banking sector is independent of external sources of funding

Owing to a high level of deposits from residents, the Czech banking sector as a whole is independent of external sources of funding. Its positive net external position increased by more than CZK 100 billion compared to the end of 2011, accounting for 7.6% of GDP at the end of 2012. Given the sector's ownership structure, the possible risks associated with relations between domestic banks and their foreign parent companies should also not be ignored, especially in a situation where the main indicators of foreign parent banks are indicating broadly worse results than those of their subsidiaries (see Table IV.2).

As for the links between domestic banks and their parent groups, the trends have been generally favourable in recent months. Following regulatory changes made in 2012,[16] the total gross exposure of the five largest domestic banks to their parent groups shrank from 60.4% of regulatory capital at the end of 2011 to 49.1% in 2012 (see Chart IV.16). The adjusted exposure, which additionally takes into account liabilities in the form of loans and deposits accepted from foreign parent banks, is meanwhile broadly constant over time. This suggests that the aggregate interconnectedness between the assets and liabilities sides of the balance sheets of Czech banks and their foreign parent banks has decreased. On the other hand, there are major differences in the exposures of the five largest banks to their parent groups – the largest total gross exposure is 69% and the smallest 21% of the regulatory capital of the bank. Moreover, these exposures tend to be unsecured.

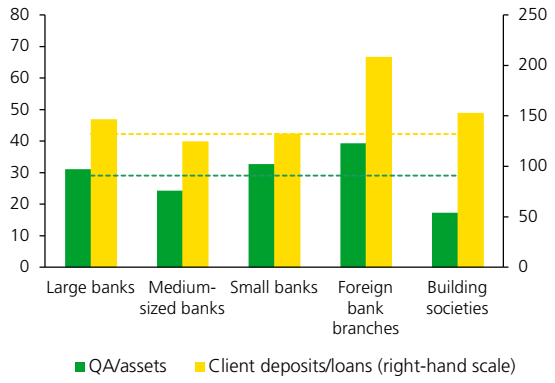
BOX 1 – THE BANKING UNION

In response to the fiscal debt crisis, the June 2012 euro area summit approved a plan to strengthen the euro area by creating a banking union. Although the Czech Republic is not a euro area member state, this plan impinges significantly on the stability of its financial system and the functioning of its financial market. In addition, the banking union project may have unintended

16 An amendment to CNB Decree No. 123/2007 Coll., stipulating the prudential rules for banks, credit unions and investment firms, in force since 1 July 2012, reduced the size of the exposure that can be excluded from the investment portfolio exposure of an institution to its foreign parent group from 75% to 50%. With the regulatory limit for investment portfolio exposure kept at 25% of capital, this decline implies a decrease in the maximum possible investment portfolio exposure (net of provisions, reserves and collateral) to the foreign parent group from the original 100% to 50% of capital.

CHART IV.15

Liquidity situation in the banking sector
(%; QA = quick assets, as of December 2012)



Source: CNB
Note: The value for medium-sized banks excludes Hypoteční banka and Česká exportní banka owing to their specific funding models. The dashed lines denote values for the banking sector. Loans and deposits include both residents and non-residents.

TABLE IV.2

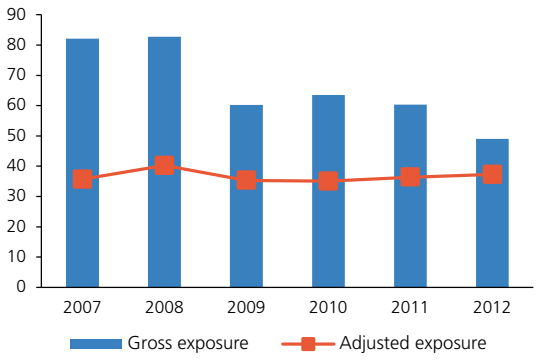
Situation of the parent groups of Czech banks
(data as of 31 December 2012; consolidated data)

	Erste Group	KBC Group	Société Générale	UniCredit Group	Raiffeisen Bank
Total assets (EUR bn)					
2012	214	257	1251	927	136
2011	210	285	1181	927	147
Net profit (% of assets)					
2012	0.3	0.2	0.1	0.2	0.5
2011	-0.3	0.0	0.2	-1.0	0.7
Impairment losses (% of assets)					
2012	0.9	0.4	0.3	1.0	0.7
2011	1.1	0.5	0.3	0.6	0.7
NPLs (%)					
2012	9.2	8.1	7.2	11.9	9.2
2011	8.5	7.6	6.9	10.4	9.0
NPL coverage ratio (%)					
2012	63.2	45.2	58.8	57.7	71.5
2011	61.7	46.7	60.5	57.9	65.5
Risk costs (bp)					
2012	150	81	91	176	121
2011	168	92	76	106	130
Capital adequacy (Core Tier 1 ratio, %)					
2012	11.2	11.7	10.7	10.8	10.7
2011	9.4	10.6	9.0	8.4	9.0

Source: Bankscope

CHART IV.16

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



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

consequences for the financial stability of the euro area and the EU as a whole. This box describes the specific risks of the banking union for the Czech financial sector and its possible adverse impacts on financial stability in the EU.

The banking union project is based on three main pillars: (i) the ECB-based Single Supervisory Mechanism, (ii) the single European Deposit Guarantee Scheme, and (iii) the single European Resolution Scheme. The banking union must be assessed in the context of all these pillars. In the first phase attention was focused primarily on the Single Supervisory Mechanism. However, the key item of the proposed new system is the mandatory borrowing facility between national insurance schemes for financing banks in distress, i.e. the fund established within the single resolution scheme. This will be paid for primarily by contributions from banks and is meant to assist in financing resolution measures for banks in distress.

Since most banks active in the Czech Republic are controlled by parent banks from euro area countries, the banking union may have a major impact on the Czech banking sector. The first reason is that EU-level supervision will be greatly strengthened, to the detriment of the powers of national supervisory authorities. The ECB will perform consolidated supervision of parent companies of credit institutions having their registered offices in a participating Member State and will also be involved in consolidated supervision (including in supervisory colleges) of parent companies having their registered offices outside the participating Member States.

The second source of risks is the promotion of the concept of group interest and solidarity of intra-group support, i.e. the prioritisation of the interests of the entire bank group, possibly even to the detriment of its individual autonomous members. Given the importance of banks for the Czech economy and the high concentration of the Czech banking sector, this concept implies major risks for the Czech Republic. First, it creates an autonomous channel for problems in foreign parent banks to spread to the balance sheets of Czech banks and to the macroeconomy via their effects on the exchange rate and the interest rate level. The plans create an environment in which a crisis in one major bank or group could easily spill over into a previously sound sector with no chance of effective defence. One of the lessons of the financial crisis is that large, complex, cross-border bank groups can become a strong source of systemic risk. Regulatory separation of the different segments of their business (product lines and regional activities) act as a barrier to the transmission of such risk.

Large cross-border banks are naturally interested in centralised capital and liquidity management. The public and the authorities, by contrast, are interested in financial market stability. Banking is by its nature primarily a local activity based on banks' ability to correctly assess specific information about their customers. Financial segmentation and risk containment generate costs for cross-border institutions. These costs, however, can be regarded as a relatively small price to pay for financial stability. A reduced degree of uncertainty about the balance-sheet quality and structure of the individual members of bank groups represents a barrier to contagion. It is thus vital for the CNB and for the resilience of the Czech banking sector to maintain effective control of liquidity and capital movements within bank groups. This means the right of supervisors to prevent disadvantageous and destabilising transfers of liquidity and assets from domestic bank and risks under the banner of the group interest, not operations based on standard business activities subject to compliance with prudential rules.

Motivating parent banks to convert large and possibly also systemically important subsidiaries into legally dependent branches would be particularly risky. Subsidiary banks are currently supervised by the national regulator, which checks their capitalisation, liquidity and overall risk profile. The conversion of a subsidiary bank into a branch would mean the transfer of most of these powers to the home supervisor. This would result in all the risks of the entire parent group and of the foreign branch operating in the Czech Republic being pooled, without the CNB – as the host supervisor – being able to prevent any negative consequences of such pooling.[17] The conversion of subsidiaries into branches would also be risky in the Czech Republic because the subsidiaries are currently self-sufficient. They have large capital and liquidity buffers which contribute significantly to public and investor confidence in their stability and facilitate smooth funding of the private and public sectors. This source of confidence and stability might be significantly weakened if they were converted into branches. This, in turn, would increase their susceptibility to financial contagion. For systemically important banks, this would represent a considerable source of risk for the whole economy. The conversion of subsidiaries into branches would also probably

17 These risks are not hypothetical. Czech banks traditionally provide loans from domestic sources and mainly in the domestic currency. However, parent banks in some other EU countries provided house purchase loans via central sources in foreign currencies, thereby fostering a property market bubble which, when it burst, had a large impact on the financial stability and real economy of the countries concerned. National authorities had minimal powers to stop this.

TABLE IV.3

Selected indicators of building societies as compared to other banks
(%; end-2011 and end-2012 data)

	2011		2012	
	Building societies	Banks excl. building societies	Building societies	Banks excl. building societies
Average interest rate on client loans for house purchase (1)	5.1	5.1	5.0	4.7
Average interest rate on household deposits (2)	2.2	0.9	2.2	0.9
Interest margin (1)–(2)	2.8	4.2	2.8	3.8
Client deposits/loans (excluding general government)	147	112	148	115
House-purchase loan NPL ratio	2.7	3.5	2.9	3.5
Quick assets/total assets	15.2	28.3	17.3	30.4
Coverage of NPLs by provisions	45.1	49.2	49.0	49.4
Tier 1 CAR	14.1	14.2	16.5	15.9
RoE	23.1	18.6	19.1	20.8
RoA	1.1	1.2	0.9	1.4
Share of sector in new loans for house purchase	25.1	74.9	22.7	77.3
Share of sector in loans for house purchase	35.1	64.9	32.9	67.1
Share of sector in household deposits	27.6	72.4	26.0	74.0

Source: CNB

foster a potentially risky shift from domestic government debt to government bonds of other countries. Overall, the national authorities' ability to respond adequately to asymmetric shocks and emerging macroeconomic imbalances fostered by imprudent banking sector behaviour would be impaired. It is therefore important for the CNB, as the national supervisor, to retain sufficient powers to enforce financial stability and prevent developments in the financial sector from having negative impacts on the real economy.

Building societies are continuing to lose market share…

Building societies are continuing to lose market share to other banks. Their share in total loans for house purchase was less than 33% at the end of 2012. The falling trend is even more visible in new loans for house purchase – while in 2010 building societies had accounted for 35% of new loans, in 2011 their share was 25% and in 2012 it was less than 23%. This trend in the building society segment is partly linked with uncertainty surrounding the future parameters of the building savings product and the related state support.[18] However, it is mostly due to the fact that banks are offering more attractive house purchase loans at lower interest rates, to which building societies can respond to only a limited extent owing to the restricted flexibility of interest rates on building savings deposits. Some building societies are therefore depositing their excess liquidity on the interbank market. As a result, claims on domestic parent banks account for CZK 55 billion (almost 90% of total claims on credit institutions).

… and have a lower share of quick assets than other banks

The building society segment is comparable with other banks in terms of capital adequacy, profitability and NPL coverage. However, it has worse liquidity because of the specific business model of building societies. Although the share of quick assets in total assets rose by 2.1 pp year on year in 2012, it remains much lower than in other banks (see Table IV.3).

Credit unions remain very risky…

Although credit unions still represent only a tiny segment of the financial sector, with a share of less than 0.7% of total assets (see line FS.4 in the *Table of Indicators*), its balance-sheet total has more than doubled in the last two years, mainly as a result of higher rates on deposits compared to banks. Despite a relative year-on-year improvement in some aggregate risk indicators and the NPL coverage ratio, these indicators worsened

18 In mid-2010, the Czech Parliament approved a reduction in state support from CZK 3,000/CZK 4,500 (depending on contract type) to a maximum of CZK 2,000 a year. A proposal to make further changes to the parameters of the building savings product, for example by introducing saving limited by purpose and allowing other banks to offer building savings schemes, is currently being considered.

substantially in 2013 Q1.[19] Moreover, significant differences continue to exist across credit unions. For example, four out of the total of 13 credit unions, representing around 50% of the assets in the segment, have NPL ratios exceeding 15%. Similarly, several institutions (46% of the segment's assets) had NPL coverage ratios significantly below the segment average of 16.4% at the end of 2012. Moreover, this average itself is much lower that that of banks (see Table IV.4).

… and some institutions need to make their business more prudent

Credit unions also exhibit a relatively high concentration of loans provided. In the majority of institutions (accounting for more than 90% of the segment's assets), the sum of the five largest exposures is close to or above their total capital. Any repayment problems among these important clients could therefore jeopardise the stability of credit unions. Maintaining relatively high interest rates on deposits in the current period of low rates may also be a risk, creating an incentive to grant risky loans at high interest rates. Negative events in the credit union segment, given its size, would not threaten the stability of the financial sector as a whole, but they could undermine the high degree of confidence in all credit institutions. In 2013 Q2, the CNB prohibited two credit unions from accepting deposits from the public and limited their other activities. The long-term efforts to stabilise the segment also include a bill discussed by the Czech government in May 2013 which should lead to some reorganisation of the credit unions and thereby prevent the emergence of any more risks (for example, a credit union with total assets exceeding CZK 5 billion would have to be converted into a bank). The CNB will continue to pay increased attention to the situation in the credit union segment and submit suggestions for regulatory changes.

Insurance companies and pension funds have benefited from financial market developments…

The legislation regulating asset placement in the insurance companies and pension funds sector requires funds accepted to be managed with prudence and professional care. The investment strategies of Czech insurers and pension funds are therefore relatively conservative and their portfolios are dominated by government bonds, with a high share of Czech government bonds. The current regulations contain no limits on investment in bonds issued by governments or central banks of OECD countries. This may lead to a risk of portfolio concentration on a single debtor. Owing to a decline in Czech bond yields during 2012, insurance companies and pension funds recorded a rise in gains from the revaluation of these instruments to fair value. This is also linked with the fact that a large proportion of these securities are marked to market in both sectors (see Chart IV.17). In future, this situation may pose a risk

19 The Tier 1 capital adequacy ratio in the credit union segment fell to 11.7% at the end of 2013 Q1. The coverage ratio decreased further to 14.9% and the NPL ratio rose to 13.2%. In addition, this high figure is notionally decreased by a large volume of new loans, which "dilutes" the NPL ratio.

TABLE IV.4

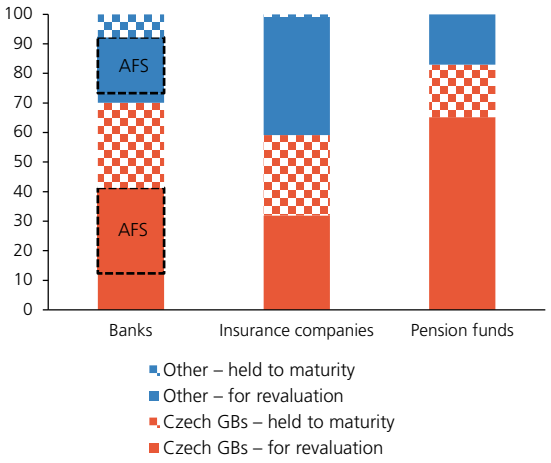
Selected indicators of credit unions as compared to banks
(%; end-2011 and end-2012 data; credit unions active as of 31 December 2012)

	2011		2012	
	Credit unions	Banks	Credit unions	Banks
Average interest rate on client loans (1)	7.9	5.1	7.4	4.8
Average interest rate on client deposits (2)	2.9	1.1	2.9	1.1
Interest margin (1)–(2)	4.9	4.0	4.4	3.8
Client deposits/loans (excluding general government)	126	117	118	120
Client NPL ratio	12.4	6.2	9.9	6.2
Quick assets/total assets	12.9	26.9	14.3	29.1
Coverage of NPLs with provisions	12.9	49.0	16.4	49.4
Tier 1 CAR	11.7	14.2	12.3	15.9
RoE	6.5	19.3	7.5	21.4
RoA	0.6	1.2	0.8	1.4
Share of sector in client loans	0.8	99.1	1.2	98.8
Share of sector in client deposits	0.9	99.1	1.2	98.8

Source: CNB
Note: The year-on-year comparison excludes Unibon, whose licence was revoked in March 2012. The accounting period is not unified across the credit union segment, so the relevant data were annualised for some institutions.

CHART IV.17

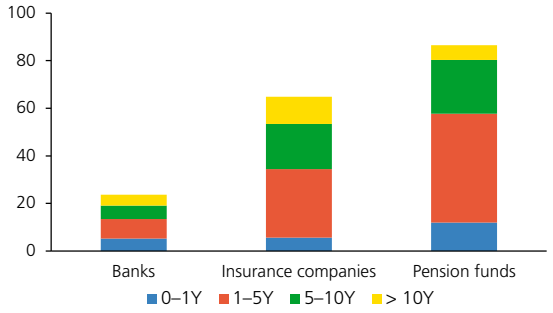
Breakdown of the bond portfolio by sector and valuation method
(%; share in bonds; as of 31 December 2012)



Source: CNB
Note: AFS denotes financial assets classed as "available for sale". The figures for the insurance sector include financial placement of unit-linked insurance.

CHART IV.18

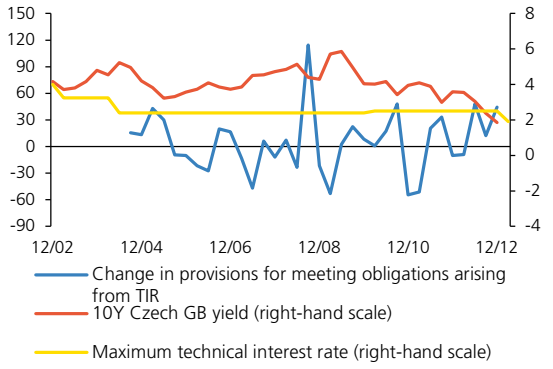
Shares of bonds in the total assets of individual sectors by maturity
(%; share in assets; as of 31 December 2012)



Source: CNB
Note: The figures for the insurance sector include financial placement of unit-linked insurance.

CHART IV.19

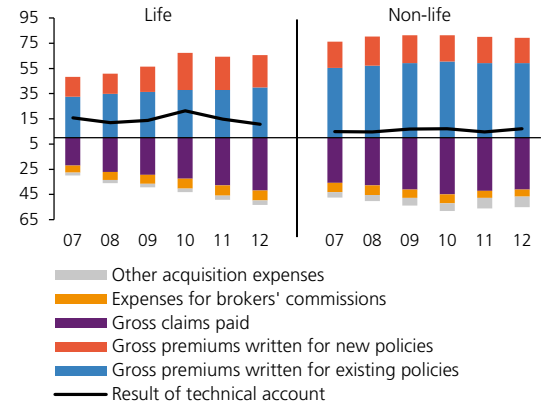
Maximum technical interest rate and provisions for meeting the obligations arising from the technical interest rate
(%)



Source: CNB

CHART IV.20

Key financial indicators for the insurance sector
(CZK billions)



Source: CNB

of a decline in the market prices of the securities held, with an adverse impact on profitability, if the financial market situation suddenly changes for the worse.

… but an excessively long period of low yields may impair their financial results

Although debt securities with long maturities dominate the financial asset placement of pension funds and life insurers (see Chart IV.18), both sectors are also characterised by long liability maturity, which usually exceeds asset maturity. The current low rates on debt securities are significantly limiting the ability of pension funds to generate returns that outpace inflation, and this, in turn, is making them less attractive to households as a form of saving. Life insurance companies face a similar problem, especially in the case of policies containing guaranteed yields, which are typical of traditional life insurance products. The low or even negative differential between market and guaranteed nominal returns is reducing the scope for generating profit on these products. An excessively long period of low yields on debt securities therefore implies a risk that both sectors will be motivated to invest in more risky assets or offer products without guaranteed returns and carry on unconventional activities.

The adverse effects of the financial cycle are being partly dampened by regulations

Thanks to strict regulations, however, the risk associated with this "search for yield" is not as relevant in the Czech pension fund sector as it is in some other European countries. In the case of insurance companies, the impact of the financial cycle on their finances is reduced by the option of valuing government bonds at amortised cost on the asset side, in combination with the parameters for creating statutory technical provisions (whose level is set using the technical interest rate) on the liabilities side. In the case of changes in the financial conditions[20] regular liability adequacy testing is reflected in the creation or release of additional reserves (see Chart IV.19). Another instrument contained in the existing regulations is a ceiling on guaranteed returns (the technical interest rate). The upper limit on the technical interest rate is 60% of the average yield on Czech government bonds maturing during the last 36 months (see Chart IV.19).[21] This limit partly reduces the competitive pressure to offer excessively high guaranteed returns on traditional life insurance products and hence also the risk associated with generating a guaranteed investment return. On the other hand, it makes traditional life insurance less attractive to households.

20 The sufficiency of technical provisions and the potential creation of additional provisions are affected by a number of other variables, such as a rising survival period.
21 The maximum technical interest rate is regulated by Decree No. 434/2009 Coll.

However, the overall trend in the insurance market is not very favourable

Despite the relatively stable and high average profitability of the sector (see line NI.6 in the *Table of Indicators*), the outlook for the insurance market is rather unfavourable, reflecting the evolution of the real economy. In life insurance, premiums written are stagnating, mainly as a result of a fall in lump-sum premium payments. Moreover, this stagnation is being accompanied by a rise in claim settlement costs, due mainly to policy survival. The slight downward trend in premiums written in non-life insurance is continuing (see Chart IV.20). This trend is most pronounced in vehicle liability insurance and vehicle accident insurance. By contrast, the financial results of non-life insurers are being favourably affected by a fall in claim settlement costs in insurance against damage to or loss of property, as no major natural disasters have occurred in the last two years.

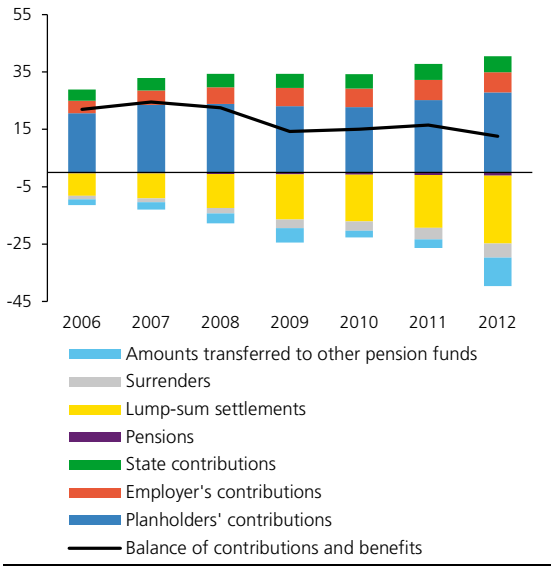
The pension fund sector has seen a surge in demand

The pension fund sector has been significantly affected by the pension system reform approved in 2012.[22] The legislative rules applying to the investment policies of pension funds (now pension management companies) were changed under amendments to the third pillar. The original savings are now managed in transformed funds maintaining the original investment conditions unless the current planholder chooses otherwise. New planholders may choose from four types of funds differing in investment strategy.

The option of retaining the original supplementary pension insurance conditions (including a guaranteed minimum zero return) associated with joining the third pillar before the pension reform took effect led to record-high interest in pension schemes in 2012.[23] The inflow of new planholders was reflected in a rise in contributions (see Chart IV.21). Benefits also recorded a further year-on-year increase. The number of planholders qualifying for a pension is also continuing to rise, in line with the demographic trend and the structure of the Czech population.[24] Pensions paid out in regular instalments are recording modest growth, but planholders still most often opt for lump-sum settlements, under which they receive 50% of their savings. Continuing extraordinary

CHART IV.21

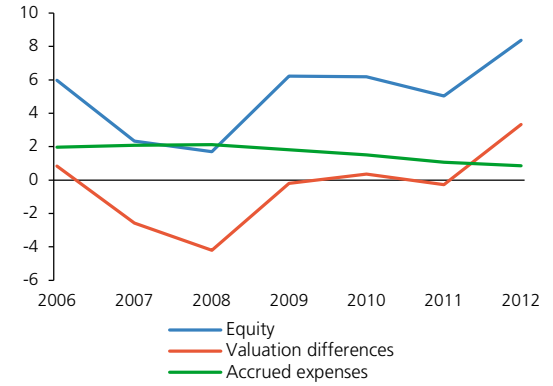
Pension fund contributions and benefits
(CZK billions)



Source: CNB

CHART IV.22

Pension fund capitalisation, valuation differences and accrued expenses
(% of assets)



Source: CNB

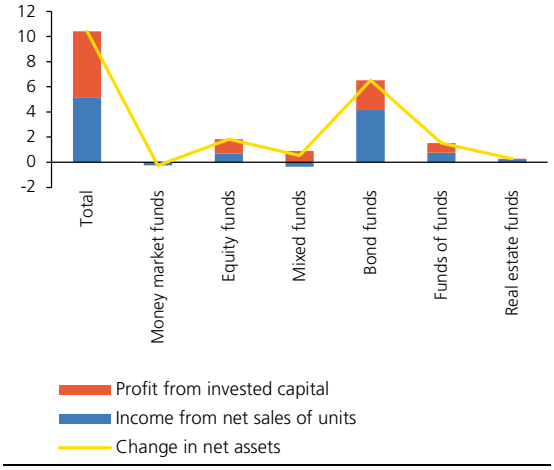
22 The reform of the pension system took effect on 1 January 2013. In addition to the existing first pillar (the pay-as-you-go system), it introduced a new second pillar in the form of fund saving. The third pillar – allowing voluntary pension schemes – was amended at the same time (for details see Box 5 in FSR 2011/2012).

23 An additional change in the conditions relates to the possibility of early termination of pension schemes. This can occur after 24 months of saving for new policies, while older policies contain a limit of 12 months. Changes were also made to the conditions for lump-sum pension payments, which, under the new policies, planholders may apply for only after reaching retirement age. Moreover, the option to take out 50% of savings after 15 years of saving (the service pension option) was abolished.

24 In this context, the parameters of entitlement to pension scheme benefits and the conditions of payment thereof are also a factor. According to the original conditions, planholders are entitled to lump-sum settlement after 15 years of saving regardless of their age. Since 2009, this entitlement has progressively been exercised for many policies arranged in the initial years following the launch of the supplementary pension insurance scheme in 1994.

CHART IV.23

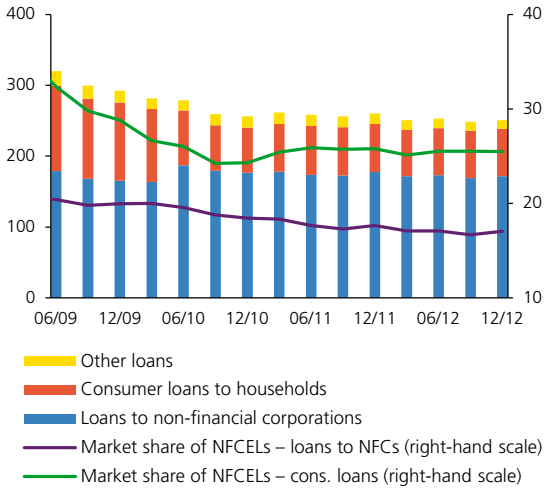
Decomposition of changes in the net assets of open-ended mutual funds intended for the public
(CZK billions; for 2012)



Source: CNB

CHART IV.24

Loans provided by non-bank financial corporations engaged in lending
(CZK billions, %)



Source: CNB
Note: Market share of total loans provided by banks and non-bank financial corporations engaged in lending to residents. Other loans comprise loans to households other than consumer loans, loans to non-residents and loans without a specified sector.

growth in migrations between funds is also partly causing growth in benefits. These migrations stem from the pension reform and from planholders' efforts to switch funds based on past performance.

The pension reform has led to a rise in the registered capital of pension funds

The pension reform also separated the management of planholder funds from the management of the fund itself. This has been reflected in a rise in registered capital (of almost CZK 1 billion). Together with a marked increase in valuation differences, this has resulted in a significant pick-up in pension funds' equity (see Chart IV.22). In 2007–2009, as a result of financial market developments, valuation differences generated accounting losses, to which pension funds responded by increasing the portfolio share of government bonds held to maturity.[25] Last year, however, pension funds reduced this part of their portfolios. This reflects favourable market developments generating accounting gains due to revaluation as well as pension funds' efforts to avoid possible liquidity problems associated with expected increased migrations between funds due to the pension reform. As in previous years, pension funds continued to release accrued expenses in 2012.

Collective investment funds recorded increased sales of units

Public interest in investing via collective investment funds (CIFs) increased in 2012 compared to the previous year. This was reflected in positive net sales of units (see Chart IV.23). Overall, CIFs generated a profit of CZK 6.7 billion in 2012. This represents a major improvement on the loss of almost CZK 6 billion recorded in 2011. Bond funds recorded the highest unit sale income thanks to higher rates of return compared to other funds stemming from a decline in bond yields and a rise in bond prices. However, as bond yields are currently at historical lows, similar results cannot be expected next year. At the same time, the current period of low interest rates is not giving money market funds investing in T-bills and short-term bonds much scope for generating investment returns. For this reason, the outflow from these funds observed in previous years continued into 2012.

Non-bank financial corporations engaged in lending recorded a slight fall in loans…

Total loans provided by non-bank financial corporations engaged in lending (NFCELs) declined by almost CZK 10 billion in 2012, to CZK 256.7 billion at the end of 2012 (see Chart IV.24). This decline was due in almost equal measure to a decrease in loans to households and in loans to non-financial corporations. Leasing companies account for almost 90% of loans provided by NFCELs. These companies are

25 The legislation allows pension funds to hold up to 30% of their assets in government bonds issued in OECD countries to maturity, and therefore recognise them at amortised cost.

increasingly shifting from financial leasing to operational leasing.[26] Figures from the Czech Leasing and Finance Association confirm that this trend continued into 2012, with operational leasing accounting for 40.5% of the amount financed by new lending (compared to 31.6% in 2011). This change in the nature of leasing companies' activities can be regarded as one of the causes of the continuing decline in the market share of NFCELs in loans to non-financial corporations. The market share of these lenders in consumer credit provided to households remains stable above 25%, despite having fallen in absolute terms in 2012. This is due in part to the drop in consumer credit provided by banks during 2012.

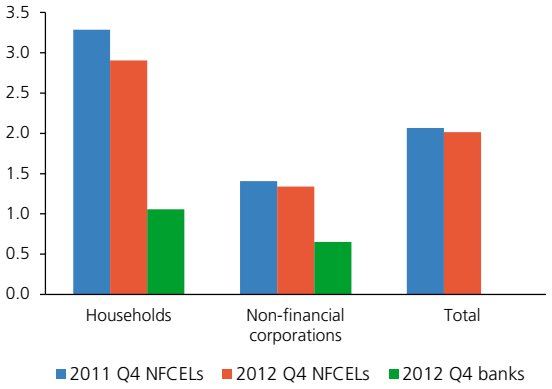
… which recorded no significant changes in riskiness in 2012

Data from the Non-bank Register of Client Information (NRCI) and from the credit register of natural persons maintained by the SOLUS association indicate that credit risk in NFCEL balance sheets fell slightly during the year. This fall pertained mainly to loans to households, for which the three-month default rate declined to 2.9% in 2012 Q4. However, the risk of default remains substantially higher in the NFCEL segment than in the banking sector (see Chart IV.25).

CHART IV.25

3M default rate on loans provided by credit institutions

(%)



Source: BRCI, NRCI, 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.

26 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.

4.2 STRESS TESTS OF BANKS, INSURANCE COMPANIES AND PENSION FUNDS

The stress tests demonstrate that the banking sector remains resilient to adverse scenarios even in a recession. Banks have a large capital buffer which enables them to absorb adverse shocks and maintain the overall capital adequacy sufficiently above the regulatory threshold of 8% even in a very unfavourable scenario. Banks also passed a liquidity stress test. The insurance company sector also showed sufficient resilience to an adverse scenario thanks to its large capital buffer. The pension fund sector remains sensitive to the price volatility of securities holdings, but a capital increase in 2012 enhanced its resilience compared to the previous year.

The stress tests are based on an adverse scenario called *Protracted Depression*, which has been extended to include other sensitivity analyses

The resilience of banks, insurance companies and pension funds was tested in macro-stress tests using a *Baseline Scenario* and a *Protracted Depression* stress scenario, representing a long-lasting and pronounced decline in economic activity in the Czech Republic (see section 2.1). As part of its stress tests, the CNB traditionally extends the stress scenario to include other sensitivity analyses that magnify the impacts of the shocks and illustrate the sectors' resilience to other relevant risks.

The bank stress test methodology has been further refined

While last year the banking sector solvency stress tests were extended to increase the test horizon from two to three years, this year's tests have been refined as regards the satellite models used, which have been re-estimated using the most recent time series. The interbank contagion test has been made slightly tougher and now takes into account total exposures between banks, not only their net exposures. Attention has also been paid to the method for estimating bank profits, which serve as the first buffer for covering potential losses and therefore play a significant role in the overall test results.

In this year's tests, the original model for estimating banks' adjusted operating profit has been extended to include an alternative approach based on the evolution of interest rates. Adjusted operating profit has been divided into interest and non-interest components.[27] While non-interest income and expenses are assumed to be constant for individual banks over the test horizon, interest income and expenses are modelled by projecting average interest rates in the main credit segments, i.e. loans to non-financial corporations, loans for house purchase and consumer credit provided to households, and other loans. Interest rates are estimated as a function of the PRIBOR interbank rate. Deposit rates are

TABLE IV.5

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

	Actual value	*Baseline Scenario*			*Protracted Depression*		
	2012	2013	2014	2015	2013	2014	2015
Macroeconomic variables							
GDP (y-o-y %)	-1.2	-0.5	1.8	2.8	-2.3	-3.3	-1.4
CZK/EUR exchange rate	25.1	25.6	25.3	25.0	26.5	27.7	27.8
Inflation (%)	3.3	1.7	1.8	1.7	1.7	1.1	-0.8
Unemployment (%)	7.0	7.7	8.0	7.7	7.9	9.2	10.0
Nominal wage growth (%)	2.9	1.2	3.5	3.8	-1.0	-4.3	-2.6
Effective GDP growth in euro area (%)	0.8	0.5	1.6	2.1	-0.1	-0.3	-0.3
Credit growth (%)							
Total	2.4	1.4	2.6	4.4	-1.5	-4.2	-1.6
Corporations	0.9	1.4	4.0	6.1	-2.9	-5.5	-2.5
Households	3.6	1.7	1.6	3.4	-0.3	-3.8	-1.0
Default rate (PD, %)							
Corporations	1.9	2.7	2.5	2.3	3.9	6.4	6.1
Loans for house purchase	3.9	4.3	3.9	3.4	4.9	7.1	6.3
Consumer credit	4.3	4.9	4.6	4.0	5.4	7.8	10.5
Loss given default (LGD, %)							
Corporations	45.0	45.0	45.0	45.0	48.6	55.3	55.2
Loans for house purchase	22.0	22.7	22.8	22.4	30.7	46.4	51.6
Consumer credit	55.0	55.9	57.1	55.9	56.9	65.7	67.2
Asset markets (%)							
3M PRIBOR	1.0	0.3	0.6	1.3	0.5	0.5	0.5
5Y yield	1.5	0.9	1.1	1.9	1.2	1.5	1.6
3M EURIBOR	0.6	0.2	0.4	0.6	0.2	0.1	0.1
5Y EUR yield	0.5	0.3	0.4	0.5	0.3	0.3	0.3
Change in res. property prices	-4.0	-1.6	0.3	1.6	-10.4	-9.9	-0.1
Change in share prices	14.0		-5.0			-25.0	
Banks' earnings							
Adjusted operating profit (y-o-y %)	-5.2	-5.3	-5.0	-2.1	-16.8	-13.8	-7.3

Source: CNB, CNB calculation, BRCI
Note: In contrast to the unemployment rate given in the previous FSR, this year's values correspond to the ILO definition of the general unemployment rate.

27 The non-interest components of adjusted operating profit include administrative expenses, fee and commission income and expenses, amortisation and depreciation, creation of reserves, dividend income and other gains and losses.

obtained by assuming that banks try to maintain a particular margin, i.e. a spread between lending and deposit rates. In contrast to the aggregate model of adjusted operating profit, this approach allows us to configure shocks to various interest rates depending on the assumptions of the scenario.

The *Baseline Scenario* indicates a rise in credit risks and a decline in the sector's profitability

Stress tests of the banking sector are traditionally one of the most important tools for assessing potential risks to the stability of the Czech financial sector as a whole. 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 still unfavourable economic outlook in these sectors is therefore reflected in growth in credit risk in the years ahead (see sections 2.2 and 2.3). The expected default rate in the *Baseline Scenario* remains elevated and increases further compared to 2012 (see Table IV.5). Given the long-standing environment of low interest rates and the increased competition, banks' adjusted operating profit is expected to continue to trend downwards by around 5% a year. Despite this worse outlook for banking sector profitability and growth in credit risks, the banking sector remains resilient over the entire test horizon and has sufficient capital reserves. The sector's aggregate capital adequacy is around 15%, i.e. well above the regulatory limit of 8%. Nevertheless, two banks (representing 1% of the sector's assets) get into a situation of insufficient capital adequacy in the *Baseline Scenario*. This is due to their business models, which the stress test methodology assesses as unsustainable from a longer-term perspective. This implies an adjustment of the banks' business models or an increase in their capital in the future (see Table IV.6, column 1).

The *Protracted Depression* stress scenario would imply a marked rise in credit risk…

In the *Protracted Depression* stress scenario, the combination of a decline in economic activity and external demand, increased unemployment and a drop in real wages would be reflected in a marked rise in credit losses and a higher default rate among both non-financial corporations and households (see Table IV.6, column 2). This is also due to the long recession eroding households' and corporations' financial reserves, which are used to repay their debts. The scenario implies significantly negative credit growth rates due to a decrease in demand for loans and limited supply stemming from a tightening of credit standards. The decrease in credit intermediation together with the low overall level of interest rates will lead to a marked fall in interest profit, causing a decline of around 33% in the total adjusted operating profit of the banking sector over the prediction horizon. The expected evolution of the economy coupled with high credit losses will therefore be reflected in an accounting loss of the banking sector in 2014 and 2015.

TABLE IV.6

Impact of the alternative scenarios on the banking sector

	Baseline Scenario			*Protracted Depression*		
	2013	2014	2015	2013	2014	2015
Expected credit losses (minus sign for losses)						
CZK billions	-24,2	-25,1	-23,4	-36,4	-67,9	-62,4
% of assets	-0,5	-0,5	-0,5	-0,8	-1,4	-1,4
Profit/loss from market risks						
CZK billions	3,7	-3,2	-7,1	0,9	-1,0	-0,9
% of assets	0,1	-0,1	-0,1	0,0	0,0	0,0
Earnings for covering losses (adjusted operating profit)						
CZK billions	73,5	69,8	68,3	64,6	55,7	51,6
% of assets	1,5	1,4	1,4	1,3	1,2	1,1
Pre-tax profit/loss						
CZK billions	52,9	41,5	37,9	29,0	-13,8	-11,9
% of assets	1,1	0,8	0,7	0,6	-0,3	-0,3
Capital adequacy ratio at end of period in %						
total	**16,0**	**16,3**	**15,2**	**14,9**	**13,2**	**12,0**
Tier 1	**15,6**	**15,8**	**14,8**	**14,5**	**12,8**	**11,6**
Capital injections						
CZK billions		0,3			16,0	
% of GDP		0,01			0,4	
No. of banks below 8% CAR		2			13	

Source: CNB, CNB calculation

TABLE IV.7

Haircuts on EU countries' exposures in *the Loss of Confidence* sensitivity analysis

Country	Haircut in %
Belgium	7
France	4
Ireland	25
Italy	25
Cyprus	35
Hungary	35
Malta	21
Germany	0
Netherlands	0
Portugal	39
Austria	4
Greece	60
Slovenia	20
Spain	25
United Kingdom	0

Source: Rating agencies, CNB calculation
Note: The haircuts are calculated using the main agencies' ratings as of May 2013 for EU countries with debt exceeding 60% of GDP. Slovenia was included in the list of countries because of increased uncertainty about the stability of its banking sector.

TABLE IV.8

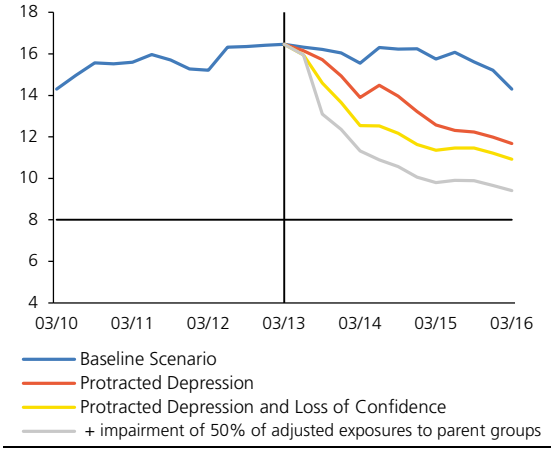
Results of the sensitivity analyses
(in *Protracted Depression* scenario)

	Protracted Depression and Loss of Confidence			*Parent groups*		
	2013	2014	2015	2013	2014	2015
Expected credit losses (minus sign for losses)						
CZK billions	-38.0	-71.8	-57.3	-38.0	-71.8	-57.3
% of assets	-0.8	-1.5	-1.2	-0.8	-1.5	-1.2
Profit/loss from market risks						
CZK billions	-16.5	2.6	3.7	-16.5	2.6	3.7
% of assets	-0.3	0.1	0.1	-0.3	0.1	0.1
Country risk						
CZK billions	-24.5	0.0	0.0	-24.5	0.0	0.0
% of assets	-0.5	0.0	0.0	-0.5	0.0	0.0
Loss from parent exposures						
CZK billions	0.0	0.0	0.0	-39.2	0.0	0.0
% of assets	0.0	0.0	0.0	-0.8	0.0	0.0
Interbank contagion						
CZK billions	-0.1	-0.7	-0.2	-0.1	-3.9	0.0
% of assets	0.0	0.0	0.0	0.0	-0.1	0.0
Earnings for covering losses (adjusted operating profit)						
CZK billions	65.0	58.8	51.0	65.0	58.8	51.0
% of assets	1.4	1.2	1.1	1.4	1.2	1.1
Pre-tax profit/loss						
CZK billions	-14.0	-11.0	-2.8	-53.2	-14.2	-2.6
% of assets	-0.3	-0.2	-0.1	-1.1	-0.3	-0.1
Capital adequacy ratio at end of period in %						
total	**13.7**	**11.6**	**11.2**	**12.4**	**10.1**	**9.7**
Tier 1	**13.2**	**11.2**	**10.8**	**11.9**	**9.7**	**9.3**
Capital injections						
CZK billions		29.6			31.5	
% of GDP		0.8			0.8	
No. of banks below 8% CAR		14			14	

Source: CNB, CNB calculation

CHART IV.26

Capital adequacy ratios depending on scenarios
(%)



Source: CNB, CNB calculation

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

Despite the adverse profitability developments and high credit losses, the banking sector's aggregate capital adequacy ratio (CAR) does not fall significantly below 12% in the *Protracted Depression* scenario. The Tier 1 CAR is about half a percentage point below the total CAR, again illustrating that the sector is well capitalised. Although the aggregate CAR is sufficiently above the regulatory minimum, 13 banks – representing about 17% of the sector – record a fall in capital adequacy below the regulatory minimum and have to strengthen their capital. The necessary capital injections total almost CZK 16 billion, i.e. around 0.4% of GDP. Relative to the size of the banking sector, this figure is not large enough to jeopardise its stability (see Table IV.6, column 2). The banking sector's stability is based on its high CAR, which went up by a further 1.2 pp compared to the previous year, and on its ability to generate income to cover losses even in the event of adverse developments.

The *Protracted Depression* scenario has been extended to include an escalation of the debt crisis and a rise in sovereign risk

One of the variants extending the *Protracted Depression* scenario is an assumption of an escalation of the euro area debt crisis, which would renew financial market tensions and lead to significant growth in yields on EU countries' government bonds. This would manifest itself in a loss of investor confidence and growth in risk aversion not only to indebted EU countries, but also to the Czech Republic. This sensitivity analysis, named the *Protracted Depression and Loss of Confidence* scenario, assumes impairment of all exposures to EU countries. However, this basic impairment is complemented by an additional assumed impairment (haircut) on exposures to EU countries whose debt exceeds 60% of GDP (see Table IV.7). This assumption generates additional banking sector losses of almost CZK 25 billion. The value of Czech government bonds held by banks would also fall given the significant assumed increase in domestic government bond yields during 2013. The sector's capital adequacy remains around 11% in the event of this additional stress (see Table IV.8).

The aggregate CAR will remain above 8% even for an extreme shock combining an adverse scenario, a loss of confidence and write-downs of exposures to parent groups

The *Loss of Confidence* stress scenario includes another stress in the form of an assumed impairment of 50% of all exposures of the five largest domestic banks to their parent groups (this sensitivity analysis is named *Parent Groups* in Table IV.8). Adjusted exposures, obtained by deducting the domestic bank's liabilities in the form of loans and deposits received from the parent bank from the total gross exposure (see section 4.1), are used for testing purposes. This extreme assumption will cause the banking sector to incur additional losses of over CZK 39 billion and a decline in its CAR below 10% (see Chart IV.26). This additional shock should be understood as a means of quantifying the transmission of adverse shocks from parent groups to the Czech banking sector rather than as an assumption that the five parent banks considered will go

bankrupt. The necessary capital injections for this shock exceed CZK 31 billion (0.8% of GDP).

The portfolio concentration test confirms significant impacts of potential bankruptcy of the largest debtors

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 around 13% and has been falling moderately in recent years (to 12.5% in 2012). On the other hand, the share of uncollateralised claims in loans to the three largest clients is rising (reaching around 53% at the end of 2012). If these debtors default, banks' credit losses could reach high levels. For this reason, an additional sensitivity analysis assuming the default of the three largest debtors of each bank is performed in the *Protracted Depression and Loss of Confidence* scenario. Given the share of uncollateralised claims in loans to the three largest clients, the test assumes an impairment of 50% for these exposures.

The assumed shock has a major impact on the stability of the banking sector, whose aggregate CAR falls towards 11.2% at the end of 2013. If off-balance sheet exposures to the three largest clients are taken into account, it falls to 10.8% (see Chart IV.27). In terms of stress, however, this test assumption is very extreme and exceeds the stress scenarios normally used owing to its strength and substantially smaller probability. The resulting CAR of the banking sector in the event of such a strong shock can therefore be regarded as positive.

An additional sensitivity analysis in the *Protracted Depression* scenario assesses the impacts of a continued recession…

The final sensitivity analysis extends the *Protracted Depression* scenario to include an assumption of a long-running recession over the entire three-year test horizon. This is accompanied by a sharper fall in household and corporate income and a further reduction of their consumption and investment. Owing to unfavourable expectations, households increase their precautionary saving and the saving rate in the economy rises further. On the other hand, in the case of lower-income households the long-running economic decline and growth in unemployment will exhaust their remaining financial reserves, causing a substantial increase in the default rate on their existing debts. Monetary policy remains inactive in this scenario and no CZK exchange rate interventions are assumed (this sensitivity analysis is named *Stronger Protracted Depression* in Table IV.9).

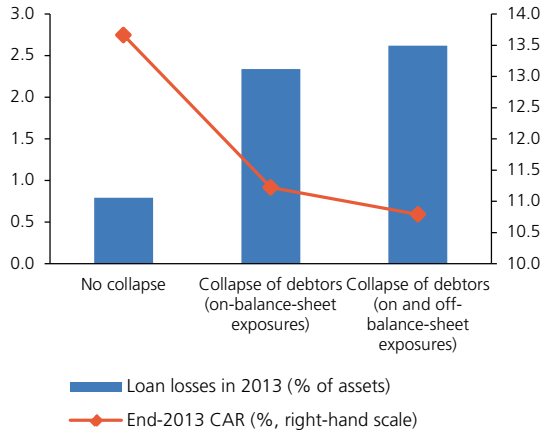
… which will be reflected in a significant rise in the banking sector's credit losses

The sensitivity analysis also assumes growth in non-linearities connected with several years of recession. This manifests itself in a significant rise in the corporate and household default rate and loss given default (LGD) in the final two years of the tests. This combination of adverse factors would be reflected in a very marked increase in banks' credit losses, which are 3.5 times higher than those expected in the *Baseline Scenario* and reach more than CZK 80 billion at the end of 2015 (see Table IV.9). Security revaluation losses are limited given the expected stability of

CHART IV.27

Impact of the collapse of the three largest debtors of each bank

(%; *in Protracted Depression scenario and Loss of Confidence*; LGD = 50%)



Source: CNB, CNB calculation

TABLE IV.9

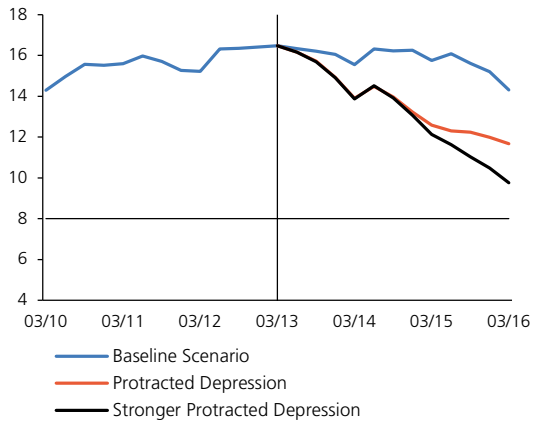
Sensitivity analysis *Stronger Protracted Depression*

	Protracted Depression			*Stronger Protracted Depression*		
	2013	2014	2015	2013	2014	2015
Macroeconomic variables						
GDP (y-o-y %)	-2.3	-3.3	-1.4	-1.8	-1.9	-2.0
Inflation (%)	1.7	1.1	-0.8	1.7	1.0	-1.4
Unemployment (%)	7.9	9.2	10.0	7.9	9.0	10.1
Nominal wage growth (%)	-1.0	-4.3	-2.6	-1.0	-4.6	-3.4
Default rate (PD, %)						
Corporations	3.9	6.4	6.1	3.9	6.7	6.9
Loans for house purchase	4.9	7.1	6.3	4.6	7.0	8.5
Consumer credit	5.4	7.8	10.5	5.4	8.2	11.0
Loss given default (LGD, %)						
Corporations	48.6	55.3	55.2	47.5	53.2	57.9
Loans for house purchase	30.7	46.4	51.6	30.7	46.9	60.2
Consumer credit	56.9	65.7	67.2	56.8	66.6	69.1
Asset markets (%)						
Change in res. property prices	-10.4	-9.9	-0.1	-9.3	-12.0	-10.3
Impact on banking sector (CZK bn)						
Credit losses	-36.4	-67.9	-62.4	-35.4	-70.1	-84.1
Adjusted operating profit	64.6	55.7	51.6	64.9	57.3	46.9
Pre-tax profit/loss	29.0	-13.8	-11.9	30.1	-14.4	-38.3
CAR at the end of period (%)						
Total	14.9	13.2	12.0	14.9	13.1	10.5
Tier 1	14.5	12.8	11.6	14.5	12.7	10.1
Capital injections						
CZK billions		16.0			29.1	
% of GDP		0.4			0.7	
No. of banks below 8% CAR		13			14	

Source: CNB, CNB calculation

CHART IV.28

Capital adequacy ratios depending on scenarios
(%)



Source: CNB, CNB calculation

TABLE IV.10

Scenario type and shock size in the bank liquidity stress test

Scenario type	Values
One-month/three-month bank run (average for banks, %)	11/20*
Drawdown of credit facilities (credit lines, % of volume)	10
Share of short-term claims on banks that will become unavailable (%)	50
Share of short-term claims on other clients that will become unavailable (%)	30
Reduction in value of government bonds eligible as collateral in CNB liquidity-providing operations (%)	25
Reduction in value of other securities (%)	30
Reduction in value of assets sold before maturity (average for banks, %)	50

Source: CNB, CNB calculation
Note: *The first figure applies to the one-month test and the second figure to the three-month test.

interest rates, but the long-running economic decline gives rise to a 15% average year-on-year decrease in banks' adjusted operating profit due to lower borrowing rates and interest margins and a reduction in banks' fees and commissions.

The banking sector as a whole remains resilient but needs sufficient capital buffers

The banking sector as a whole makes an accounting loss in the final two years of the test horizon, and 14 banks – representing almost 19% of the sector – find themselves in a situation of insufficient capital adequacy. Almost CZK 29 billion in capital injections would be needed. Capital injections of similar magnitude were required in the above-mentioned sensitivity analyses, which subjected the banking sector to additional losses (e.g. impairments of exposures to indebted EU countries). However, these losses were never as large as a result of adverse developments in the corporate and household sectors alone. In this negative scenario, the banking sector's aggregate CAR would stay above the regulatory threshold of 8% (see Chart IV.28), but if the adverse trend continued beyond the three-year test horizon it could fall below the critical level. Although the assumption of this sensitivity analysis is relatively extreme, its results underline the importance of banks keeping sufficient capital buffers to cover losses stemming from very adverse unexpected developments and maintaining their current resilience to negative shocks.

Liquidity tests confirm the good liquidity position of banks in the Czech Republic

The assessment of the banking sector's resilience also involved applying a liquidity stress test in the *Protracted Depression* scenario (see Table IV.10). The two-round macro-stress-testing model presented in FSR 2010/2011 was used to test banks' liquidity risk. The test focuses on the resilience of the liquidity buffer of banks to potential liquidity shocks. The first round of the impact involves the emergence of a potential gap in banks' balance sheets associated with increased demand for asset financing amid lower resources (see the first two items of Table IV.10) and a concurrent decline in the value of some assets (the other items) with no difference in their accounting, i.e. the revaluation also affects assets held to maturity. The outflow of deposits and the decline in the value of assets sold before maturity are expressed as average values of various parameters applied to a specific bank. These were derived from the results for individual banks obtained in the solvency stress tests presented above.[28] The second round of shocks emerges as a result of a rise in reputational and systemic risk brought about by banks' efforts to close the liquidity gap and is expressed through additional losses arising from the revaluation of securities held in the balance sheet. Overall, these are scenarios with a very high degree of stress.

28 Banks that incurred accounting losses in the credit risk stress scenarios face a greater outflow of liquidity than profitable banks. In sales of illiquid assets, account is taken of the quality of the bank's assets as measured by the credit portfolio risk costs.

The scenario was applied individually to 23 banks having their registered offices in the Czech Republic at the one-month and three-month horizons. To assess balance-sheet liquidity, the liquidity buffer (LB) was selected.[29] It was calculated at its initial value and after the application of the two rounds of liquidity shocks (see Chart IV.29). The initial liquidity buffers (the full columns) suggest a relatively high level of quick assets in the banking sector as a whole (over 20%). The lowest level of quick assets is held by building societies (below 20% in most cases). The impacts of the negative shocks on the balance sheets of the groups of banks monitored were quite mixed (see Chart IV.29).

On average, small banks would be hit hardest at the one-month horizon, followed by large banks, while building societies followed by small banks would be hit hardest at the three-month horizon. The liquidity buffer would decline by more than two-thirds on average. If the three-month horizon was applied, the volume of quick assets of the building society sector would fall by more than 90%. This is due to the configuration of the building savings system, where a significant share of time deposits consists of deposits redeemable at notice of three months. The liquidity buffer would be fully exhausted by two banks in the case of the one-month test and by six banks in the case of the three-month test. This is due to the types of business model chosen by individual banks and the total volume and composition of quick assets held (see Table IV.11). Very specific business models (especially in the case of some medium-sized and small banks) where long-term assets financed by issues of own securities stand against the minimum liquidity buffer (of about 5% on average) cannot withstand the simulated stress by definition.

The composition of the liquidity buffer varies from bank to bank. While large banks, small banks and most building societies hold a large part of their liquidity in the form of Czech government bonds, medium-sized banks have a more balanced allocation across other assets of the liquidity buffer. Medium-sized banks were the best performers on average in this test; however, if a larger stress was applied to uncollectibility of short-term claims, for example owing to a frozen interbank market, the results of these banks would not be so favourable. Similarly, if a scenario similar to the Greek crisis was applied, with Czech government debt being subject to large write-downs due to materialisation of sovereign credit risk, the results would be much worse for building societies and other banks with high concentrations of Czech government bonds in their balance sheets.

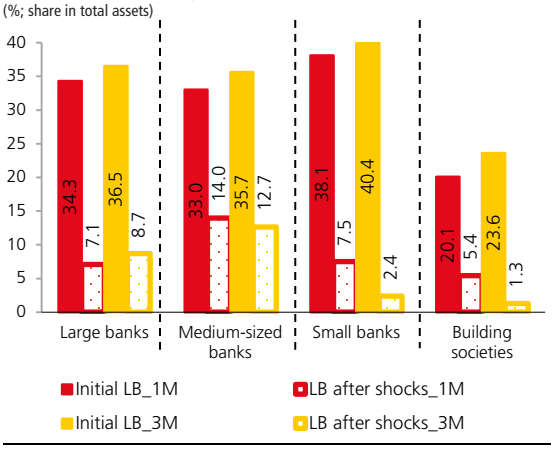
Although the conditions of the scenario were relatively tough, the banks tested withstood the simulated shock and would be able to close the potential liquidity gap within one month or three months even under worse market conditions. The good liquidity position of domestic banks is

[29] The liquidity buffer the one-month horizon is defined as the sum of cash, claims on the central bank, Czech government bonds and claims maturing within one month, while claims maturing within three months are taken into account for the three-month horizon.

CHART IV.29

Results of the liquidity test

(%; share in total assets)



Source: CNB, CNB calculation
Note: LB = liquidity buffer; 1M = one-month; 3M = three-month.

TABLE IV.11

Composition of the liquidity buffer for claims with maturities of up to one month

	Large banks	Medium-sized banks	Small banks	Building societies
Cash	2.5	0.3	0.9	0.0
Claims on				
central banks	21.7	24.2	21.5	10.9
credit institutions up to 1M	7.0	13.3	13.7	7.1
general government up to 1M	0.1	0.0	0.0	0.0
other clients up to 1M	15.3	13.8	9.7	0.2
Bonds issued by Czech government in CZK	49.2	29.2	49.0	61.5
Bonds issued by CNB in CZK	0.0	0.0	0.0	0.0
Liquidity buffer/total assets	33.7	30.5	43.1	19.1

Source: CNB
Note: The figures in the table express the median for the relevant banks.

also evidenced by a survey of LCR ratios under the CRD IV/CRR rules. The survey results show that Czech banks would easily comply with the required limits by a sizeable margin.

TABLE IV.12

Results of the pension fund stress tests
(one-year horizon)

		Baseline Scenario	*Protracted Depression and Loss of Confidence*
Equity (as of end of 2012)	CZK billions	22.9	22.9
	% of assets	8.4	8.4
Allocation of 2012 earnings for policyholders	CZK billions	-4.0	-4.0
	% of assets	-1.5	-1.5
Losses arising from interest rate risk	CZK billions	-0.2	-4.2
	% of equity	-1.1	-18.4
Gains/losses from changes in share and unit value	CZK billions	-0.2	-1.4
	% of equity	-0.9	-6.0
Exchange rate gains/losses	CZK billions	0.5	2.8
	% of equity	2.0	12.4
Gains/losses from changes in property value	CZK billions	-0.03	-0.2
	% of equity	-0.1	-0.8
Impact of risks on equity	CZK billions	-0.02	-2.9
	% of assets	-0.01	-1.1
Equity (as of end of 2013)	CZK billions	18.9	15.9
	% of assets	7.1	5.9
Equity (as of end of 2013) In event of assumed fall in equity of CZK 10 billion due to valuation differences	CZK billions	-	5.9
	% of assets	-	2.2

Ad-hoc sensitivity analysis in the pension fund tests
(one-year horizon; additional shocks in individual scenarios)

		Baseline Scenario	*Protracted Depression and Loss of Confidence*
Revaluation of instruments held to maturity	CZK billions	-0.2	-3.7
	% of assets	-0.1	-1.4
Exposure impairment risk	CZK billions	-0.9	-0.9
	% of assets	-0.3	-0.3

Source: CNB, CNB calculation

The stress tests of insurance companies and pension funds assess the resilience of the two sectors to a marked rise in interest rates

The stress tests of insurance companies and pension funds focus on assessing the risks to the two sectors at the one-year horizon. Together with the *Baseline Scenario*, their resilience to an extended stress scenario *Protracted Depression and Loss of Confidence* was also tested; this variant captures adverse economic developments coupled with increased financial market uncertainty and a loss of investor confidence in the Czech Republic. The assumptions of this scenario are reflected in a marked depreciation of the exchange rate and a sharp rise in Czech government bond yields. This may pose a significant risk to insurance companies and pension funds, which hold a large proportion of their portfolios in debt securities.

The pension fund stress tests demonstrate that the sector is sufficiently resilient thanks to its high equity

The results of the pension fund tests confirm the sector's strong resilience to the risks assumed. This is due mainly to its high level of equity. However, equity rose considerably during 2012 (by more than CZK 10 billion) owing to a rise in valuation differences (see Chart IV.22) and could decrease substantially again in the event of adverse financial market developments (see Table IV.12). This is also evidenced by the developments in recent years – as a result of adverse financial market developments the pension fund sector recorded a decline in equity to CZK 3.2 billion in 2008, mainly because of a marked valuation loss of almost CZK 8 billion.

Furthermore, the test results show that in the adverse scenario pension funds would be hit hardest by credit risk losses exceeding CZK 4 billion. By contrast, the assumed exchange rate depreciation would generate gains for the sector due to a rise in the value of the portfolio allocated in foreign currency. The sector's low sensitivity to a drop in stock prices reflects the fact that investment in shares and units declined further during 2012. In fact, four pension funds completely liquidated their equity securities portfolios. Real estate risk is still almost negligible in Czech pension funds. The overall impacts of these shocks suggest that the sector is sufficiently resilient to the assumed adverse developments (equity stays above 2% of assets) even when a decrease in equity of CZK 10 billion due to valuation differences is assumed in the stress scenario.

Ad-hoc sensitivity analyses test additional risks that might imply losses for the sector

Two sensitivity analyses were conducted beyond the basic market risks facing the pension fund segment. The first sensitivity analysis focuses on assessing the losses that would arise from a decline in prices of government bonds held to maturity if these bonds were revalued to the market price. If this portfolio was revalued, pension funds would record

additional losses of CZK 3.7 billion in the *Protracted Depression and Loss of Confidence* adverse scenario. This loss is much lower than in last year's tests, reflecting the fact that pension funds substantially reduced their portfolios of securities held to maturity during 2012 (see section 4.1). The second sensitivity analysis focuses on the risks arising from exposures to highly indebted EU countries and assumes their partial impairment (see Table IV.7). Pension funds would record no significant losses in this case (less than CZK 1 billion). This is due to their relatively low exposure to the rest of the world, which fell further in 2012.

The stress test of insurance companies confirms the sector's strong capital position…

Like the pension fund tests, the stress tests of insurance companies were performed for the *Baseline Scenario* and for the extended adverse *Protracted Depression and Loss of Confidence* scenario. Stability can be expected in this sector under the *Baseline Scenario*. Slight revaluation losses on shares and debt securities should be partly offset by profits from insurance activities in the absence of major natural disasters. Therefore, the aggregate solvency rate at the end of 2013 should be roughly the same or slightly lower than a year earlier.

… and its resilience to adverse developments

In the adverse scenario, insurance companies would be hit hardest by losses from interest rate risk totalling 2.1% of assets, revaluation losses on shares and units totalling 1.9% of assets, and revaluation losses on government bond holdings (see Table IV.13). However, the impact of interest rate risk would be partly offset by revaluation gains on technical provisions (release of LAT provisions, see section 4.1) due to higher yields on government bonds. The cumulative impact of all the risks considered on the available solvency margin (ASM) in this scenario would be CZK 22.6 billion, or 6.1% of the assets of the sample of insurance companies tested. Given the expected profit of CZK 9.6 billion and planned dividends of around CZK 9.4 billion, the ASM would drop from CZK 58.7 billion (16%) to CZK 38.9 billion (10.6%). As a result, the aggregate solvency ratio would decline from 305% to 202%, but would stay above the regulatory minimum of 100%. As a result of these adverse developments, one insurance company would fall below the minimum solvency ratio. The necessary capital injections would amount to CZK 262 million. Despite these risks of losses, the insurance company sector can be assessed as stable and resilient to adverse developments.

TABLE IV.13

Results of the insurance company stress tests

		Baseline Scenario	*Protracted Depression and Loss of Confidence*
Equity risk	CZK billions	-0.76	-6.85
	% of assets	-0.21	-1.86
Real estate risk	CZK billions	-0.08	-0.74
	% of assets	-0.02	-0.20
Exchange rate risk	CZK billions	0.00	-0.27
	% of assets	0.00	-0.07
Interest rate risk	CZK billions	-0.18	-7.80
	% of assets	-0.05	-2.12
Credit spread risk	CZK billions	-0.38	-0.72
	% of assets	-0.10	-0.19
Risk of fall in GB prices	CZK billions	-0.38	-3.96
	% of assets	-0.10	-1.08
Premium risk	CZK billions	-0.01	-2.22
	% of assets	0.00	0.60
Impact of risks on ASM	CZK billions	-1.44	-22.55
	% of assets	-0.39	-6.14
Projected earnings from insurance activities in 2013	CZK billions	9.60	9.60
	% of assets	2.61	2.61
Planned dividends for payment in 2013	CZK billions	-9.41	-9.41
	% of assets	-2.56	-2.56
Other impacts (tax)	CZK billions	0.40	2.70
	% of assets	0.11	0.73
ASM (as of end of 2012)	CZK billions	58.74	58.74
	% of assets	15.98	15.98
ASM (as of end of 2013)	CZK billions	57.71	38.89
	% of assets	15.70	10.58
Solvency ratio	2012	305%	305%
	2013	300%	202%

Source: CNB, CNB calculation

5 RISKS TO FINANCIAL STABILITY AND MACROPRUDENTIAL POLICY

The aim of this section is to assess the main risks to financial stability and to assign risk mitigation tools to them. To this end, the text evaluates the size of 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. The second part presents a new concept, a macroprudential dashboard. The third part shows the main sources of risks to financial stability and describes measures the CNB might take to reduce them. The fourth, fifth and sixth parts provide information about regulatory developments and the ways in which macroprudential tools can be applied. The final part describes the regulatory environment in the EU and points at the moral hazard risks of the banking union.

5.1 ASSESSMENT OF RISKS TO FINANCIAL STABILITY

In advanced countries, risks that originated in the pre-crisis boom and during the crisis are dominant…

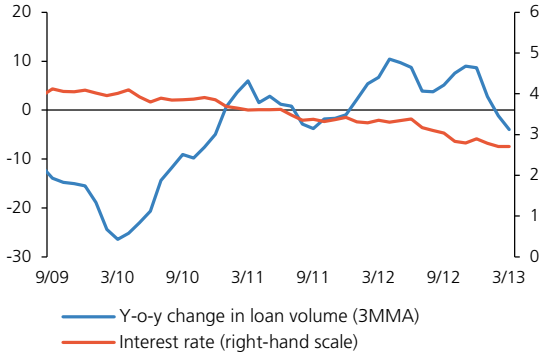
The advanced countries are in a phase of the financial cycle dominated by risks that originated in the pre-crisis boom and during the crisis. The euro area authorities succeeded in preventing disorderly deleveraging, but at the expense of clearing the distressed banks' balance-sheets of poor-quality assets too slowly and postponing the recapitalisation that is vital to restore sound lending. Overall, therefore, the deleveraging may take some time and the ability of some banking sectors to finance viable projects will continue to be limited, fostering stagnation of the real economy.

… but risks associated with the present financial environment are starting to emerge as well

Despite not very optimistic expectations and a reduced willingness to accept risk, some advanced countries are still maintaining financial imbalances and trends which may to some extent take the form of bubbles. Property prices in some countries remain high and even increased further in 2012. The combination of high property prices and high private sector debt in an environment of weak economic growth increases the probability of a downturn in prices. Another source of risk is that the search for quality and yield is – amid heightened uncertainty and very low short-term interest rates for key currencies – being reflected in unusually low yields on some countries' government bonds and on many corporate bonds (see section 3.1). Stronger growth in long-term interest rates could thus generate, in addition to market losses, a sharp rise in financial market volatility. Stronger growth in long-term yields could simultaneously lead to large losses, mainly among leveraged investors. They might react with increased sales of bonds, further intensifying the adverse procyclical market reaction.

CHART V.1

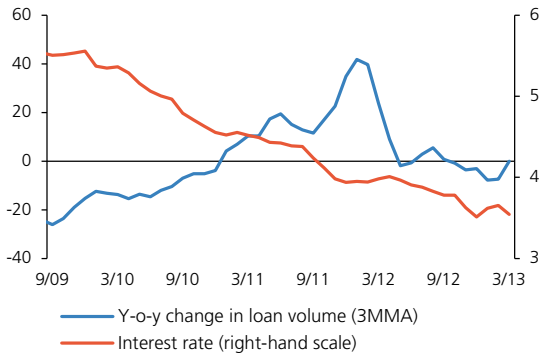
New koruna loans to non-financial corporations
(including overdrafts; %)



Source: CNB
Note: 3MMA denotes three-month moving average.

CHART V.2

New koruna loans for house purchase
(%)



Source: CNB
Note: 3MMA denotes three-month moving average.

The financial cycle in the Czech Republic is being affected by weak economic activity and pessimistic expectations

Lending growth and activity in the domestic financial sector currently reflects the unfavourable trend in the real economy, the elevated uncertainty regarding the timing and extent of the recovery, and risk aversion. The modest post-crisis credit recovery ended with the onset of the recession in 2012 and demand for loans and risky assets is now subdued despite the historically low interest rates. Economic agents are aware of the risks of a continued recession, a further decline in prices of property and other assets and a generally increased probability of default. The growth rate of new loans in both the main credit categories (loans to non-financial corporations and loans to households for house purchase) has been fluctuating around zero over the last two quarters (see Charts V.1 and V.2). Following a strong pick-up in 2011 due to a rise in loan refinancing, growth in loans for house purchase slowed again in 2012. This means that activity in this segment is relatively high, but is not rising any further.

The interest rate component of the credit conditions has eased and margins on new loans have decreased further

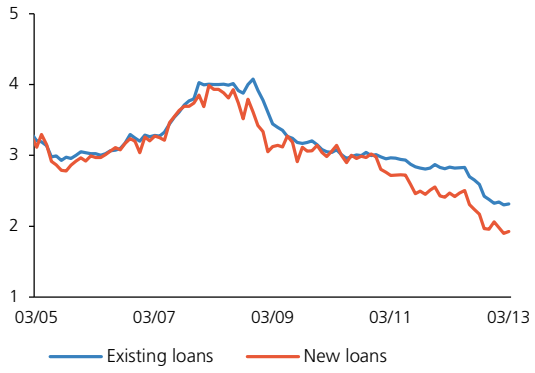
The interest rate component of the credit conditions has eased further. This can be regarded as positive, as it reduces the risks associated with the decline in economic activity and is thus countercyclical. Interest rates on new loans are at historical lows for both of the most important bank loan categories, allowing corporations and households to move gradually to lower debt servicing costs (see Charts V.1 and V.2). The credit conditions have tightened only in the case of consumer credit, as a result of its elevated level of risk (see section 2.3). A prevailing easing of the interest rate conditions is also indicated by interest margins, as measured by the difference between the relevant lending and deposit rates. The steady fall in margins on new loans over the last few years is increasingly being reflected in margins on the stock of loans (see Charts V.3 and V.4). As a result, banks are facing growing downward pressure on interest income on their credit portfolios. Given the continuing domestic recession, the considerable risks stemming from the external environment and the renewed growth in credit risk (see Chart V.5), the danger that margin levels are not always consistent with appropriate risk assessment for new loans has increased.

The volume of loans is commensurate with the size of the Czech economy

The ratio of loans to GDP in the Czech Republic is currently roughly at its trend level (see Chart V.6). In addition, an estimate of the equilibrium level based on economic fundamentals indicates that the real sector's debt is still below the average for similarly advanced countries. Given the subdued growth in lending, the Czech financial sector thus faces no risks from excessive amounts or growth rates of credit. According to the EU capital adequacy directive (known as CRD IV; see section 5.7), a deviation of the loan-to-GDP ratio from its trend is the initial credit boom indicator used to determine the size of the countercyclical capital buffer. Section 5.4 contains more accurate indicators (taking into account

CHART V.3

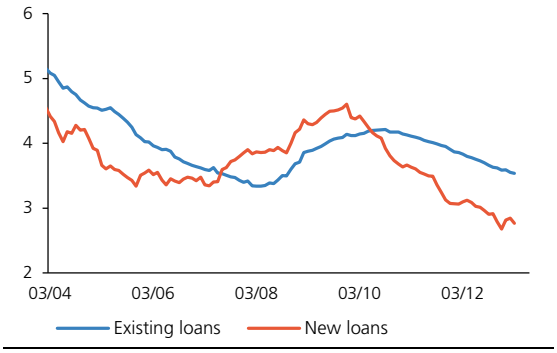
Margins on bank loans to non-financial corporations
(percentage points p.a.)



Source: CNB

CHART V.4

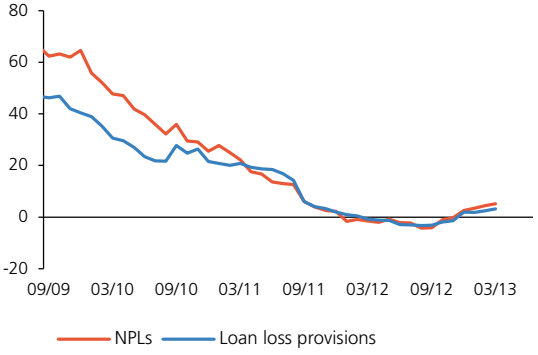
Margins on bank loans to households for house purchase
(percentage points p.a.)



Source: CNB

CHART V.5

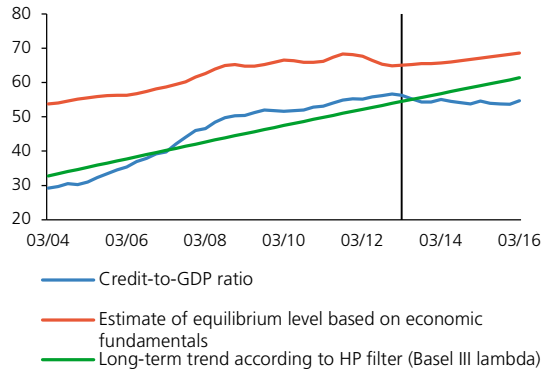
Growth in NPLs and loan loss provisions to total claims
(year-on-year change in %)



Source: CNB
Note: Loan loss provisions refers to ratio of provisions to total claims, i.e. "default" claims and "non-default" claims.

CHART V.6

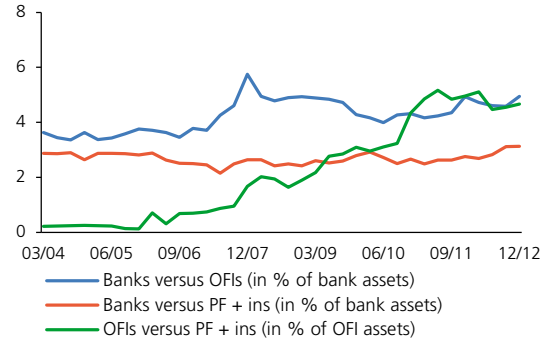
Assessment of real sector debt in the Czech Republic
(%; bank loans only)



Source: IMF IFS, CNB, CNB calculation
Note: Estimate of equilibrium level based on method described in Geršl, A., Seidler, J.: *Credit Growth and Capital Buffers: Empirical Evidence from Central and Eastern European Countries,* CNB Research and Policy Note 3/2011.

CHART V.7

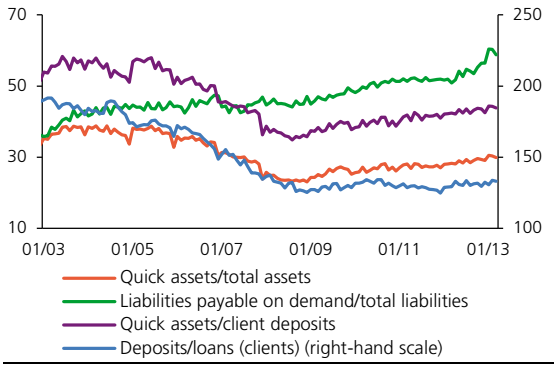
Links between segments of the financial sector
(sum of all mutual exposures, including asset and credit exposures, in % of assets and liabilities between sector pairs)



Source: CNB (financial accounts)
Note: OFIs comprise other financial corporations engaged in lending, security dealers (on own account) and mutual funds other than money market funds; PF + ins comprises pension funds and insurance companies.

CHART V.8

Liquidity ratios in the banking sector
(%)



Source: CNB

developments in the Czech economy) as well as an assessment of the need for setting a countercyclical capital buffer.

The sources of the structural component of systemic risk are gradually strengthening

The segments of the financial sector are interconnected both directly and indirectly. Direct links arise through exposures in the form of mutual deposits and loans, and also through ownership interests. In 2011 and 2012, following a decline, the growth rate of most of the direct links rose again in absolute terms, while their strength in relation to assets fluctuated over time (see Chart V.7). The financial segments are interconnected indirectly via exposures to the same sectors. Whereas concentration risk continues to be increased by rising exposures to the government sector (see section 3.1), the concentration of bank loan portfolios vis-à-vis corporations is falling steadily. Exposures to parent groups are decreasing as well (see section 4). Growth in the links between non-bank financial corporations (pension funds, insurance companies, mutual funds, etc.) has been observed in the financial corporations sector in recent years (see Chart V.7). The other links monitored in the financial sector are exhibiting an only slightly rising trend. Overall, the structural component of systemic risk is increasing slightly, generating an increase in the risk of emergence and transmission of financial distress via intersectoral financial links.

The structural component of systemic risk is being suppressed by robust banking sector liquidity

The Czech banking sector has long had above-average liquidity by international comparison and its liquidity position improved further in 2012. The sector has a significant excess of deposits over loans, and the ratio of quick assets to both total assets and client deposits is increasing. However, the environment of a low and relatively flat yield curve, persisting uncertainty and risk aversion is fostering growth in the ratio of liabilities payable on demand to total liabilities. This is causing maturity transformation to increase, which may represent a potential risk factor if sudden, sharp shocks occur (see Chart V.8).

5.2 THE MACROPRUDENTIAL DASHBOARD

This FSR presents a macroprudential dashboard for the first time. The dashboard is intended as a tool for describing the main features of the current situation and trends in the economy and the financial sector from the systemic risk and macroprudential policy perspective. It provides a simplified overview of some forward-looking indicators.

The dashboard is divided into three parts, as threats to financial stability usually result from a combination of three factors, namely: (1) the materialisation of various types of risks, i.e. the occurrence of shocks affecting the financial system (such materialisation is described or signalled in advance by risk factors); (2) the financial system's tendency to amplify the initial shock (interconnectedness of financial institutions, etc.); (3) financial institutions' ability to absorb the impacts of factors (1) and (2). For the sake of clarity, the dashboard provides just a few selected key indicators for each of these three factors.[1]

The graphical part of the dashboard (Table V.1) consists of one mini-chart for each indicator. The mini-chart describes the evolution of the indicator over the last two years, i.e. in 2011 (the upper, outlined bar) and 2012 (lower, filled-in bar) in this year's FSR. The position of the indicator to the left or the right of the vertical axis is based on a comparison with a benchmark: values below the benchmark are shown to the left and values above it to the right. The benchmark for the credit-to-GDP ratio is the trend level. Those for the other indicators are usually the average since 2002 (or later due to a shorter available time series). In future, the benchmarks for some of these indicators will be derived from an empirical analysis more accurately capturing the equilibrium or historically normal evolution of the indicators.

The dashboard should provide implications for the desirable direction of changes in the overall configuration of macroprudential policy. These implications – as perceived by the CNB – are illustrated using different colours in the mini-charts. Red indicates a need to consider tightening policy. Green has the opposite interpretation, or at least suggests that there is no need to consider tightening. Grey indicates that the macroprudential implications are ambiguous. The macroprudential implications are depicted in this way in all three parts of the dashboard.

When reading the dashboard, one should bear in mind that it is intended mainly to aid communication. The CNB's decisions on the configuration of macroprudential tools cannot be based mechanically on the dashboard alone, but must draw on many other, more detailed data and considerations. The multi-criteria nature of the financial stability objective makes it necessary to assess the direction of causality for each indicator, i.e. to assess whether a particular value reflects the emergence of future risks or the materialisation of past risks, whether it indicates a short-term

1 Some indicators may be included in two or more parts of the dashboard.

or long-term risk, and numerous other factors.[2] Caution is required in interpreting the dashboard also because the time series on which it is based are quite short.

The current prevalence of green indicators suggests that a significant across-the-board tightening of the macroprudential parameters is not necessary in the present situation and that recession-related short-term risks are dominant. Several of the red indicators relate to the property sector and lending to it, although the level of risk indicated is quite low. A more detailed assessment of the risks described by the individual indicators is given in the following subsections.

TABLE V.1

Key financial stability indicators in 2011 and 2012
(distance from benchmark expressed as number of standard deviations)

1. RISK FACTORS	
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 paid on CET1 of banks (%)	
1b. Medium-term	
Loans/GDP (%)	
Credit growth (%, end of period, year on year)	
Public sector debt/GDP (%)	
Household debt/nominal gross disposable income (%)	
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	
Interconnectedness in banking sector (%)	
Concentration of claims (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 ratio (bank assets/equity)	
3b. Absorption of credit risk	
Aggregate LTV for housing mortgages (%)	
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
Note: Note: Green (red) indicates a need to consider looser (tighter) macroprudential policy; grey signifies no clear indication in either direction. The benchmark for the loans/GDP ratio is the estimated trend level; those for the other indicators are the average since 2002 or later (depending on data availability).

2 More details on this topic are available in Frait, J., Komárková, Z. (2012): *Macroprudential Policy and Its Instruments in a Small EU Economy*, Czech National Bank Research and Policy Note No. 3/2012. The ability of various indicators to predict financial crises is empirically estimated, for example, in Babecký, J., Havránek, T., Matějů, J., Rusnák, M., Šmídková, K., Vašíček, B. (2011): *Early Warning Indicators of Economic Crises: Evidence from a Panel of 40 Developed Countries*, CNB WP 8/2011.

5.3 SYSTEMIC RISKS AND MACROPRUDENTIAL POLICY RECOMMENDATIONS

Credit risk remains the focus of the CNB's attention

A potential deterioration of the credit portfolio resulting from adverse developments in the real economy remains the main risk to the Czech banking sector. It can be deduced from the growth in NPLs and the related provisioning (see Chart V.5) that the inflow of new NPLs has accelerated slightly in recent quarters and the total volume of NPLs will probably start rising (see sections 2.2, 2.3 and 4.1). If the recession continues or even deepens, the balance sheets of Czech banks may become more sensitive to changes in the income situation of corporations and households. This could be reflected in a rapid non-linear increase in the default rate. It should not be overlooked, however, that the currently low interest rates on loans may partly be concealing distress among many debtors as regards their ability to service debts with their existing income flows.

Banks must maintain a high loss-absorbing capacity

To maintain high public and investor confidence in the stability of the Czech banking sector in an environment of adverse developments in the real economy and financial distress in the euro area, banks must maintain a high capacity to absorb potential credit and market losses. This means that they must have sufficient provisions to cover expected losses as well as adequate capital buffers to cover unexpected losses. Maintaining robust capital buffers is of particular importance for banks that are systemically important as a result of their position and character (see section 5.6). There are concerns in many European countries that banks are not setting aside enough provisions and reserves for default claims. This is due not only to underestimation of potential losses, but also to the current method of accounting for the above items.[3] Potential insufficiency of provisions in domestic institutions is indicated in some of the analyses in section 4.1. The present capital adequacy level of most Czech banks shows that they are able to withstand unexpected losses in the event of a relatively adverse economic situation close to the *Protracted Depression* stress scenario (see section 4.2). However, continued attention of the regulator is necessary in this area too. One reason for this is that the capital requirements for covering these losses are based on estimated risk weights applied to individual assets. These weights depend on estimates of the probability of default (PD) and loss given default (LGD). There are signs, albeit very slight ones, that some banks are using advanced internal models in a way that underestimates the risk of losses and biases the estimated risk weights downwards. If the risk weights were too low, capital adequacy would seem higher than it is in reality and banks might not have enough capital to cover losses in the event of strongly adverse shocks.

3 The shortcomings in the existing accounting framework become more apparent in periods of low interest rates, when forbearance is a relatively "cheap" strategy.

In the near future the CNB will focus on taking an appropriate approach to assessing credit risk

In its supervisory activities the CNB will focus on ensuring that credit institutions are valuing their claims appropriately, are creating sufficient provisions for default claims and are setting conservative risk weights for the calculation of capital requirements. It is particularly important that banks do not underestimate the probability of default and the final losses given default. The observed gradual increase in the share of mortgage loans with floating interest rates or very short rate fixation periods is natural in an environment of low interest rates. However, the CNB will also analyse the sensitivity of the credit risk of mortgage portfolios to a rise in interest rates, as such a rise could make it difficult for some debtors to pay their debts.

The risk of property price overvaluation has decreased…

Thanks to falling property prices in recent years and a related improvement in property price sustainability indicators (see section 3.2), property prices are now very probably close to their fundamental values and the perceived risk of a further decline in these prices has decreased. As the fall in property prices has been accompanied by slowing growth in loans for house purchase and a falling number of property transactions, the danger of a property price bubble is not currently relevant anywhere in the Czech Republic.

… but some elements of the market situation are leading to the preparation of macroprudential tools in this area

The different trends in prices and the number of transactions across regions (smaller declines – or even increases – in Prague than in the rest of the country), together with the higher profitability of property purchased as a financial investment (due to rising rental returns and falling returns on speculative assets and interest rates on loans for house purchase) may, however, imply certain medium-term risks. A potential property price bubble may also emerge in local markets "from below", with property prices rising at a relatively modest pace while their fundamentals worsen. The CNB, as a macroprudential authority, is thus preparing a set of appropriate tools enabling it to react to any risks associated with movements in property prices and loans to this sector. These tools could include, for example, sector-specific risk weights for the calculation of capital requirements for banks or limits on LTV ratios, which are analysed in more detail in section 5.5.

The risks associated with sovereign exposures require regular monitoring

Like their counterparts in other European countries, Czech banks have a large proportion of their assets held in domestic government bonds (see section 4.1). This creates significant exposure to general government and thereby gives rise to sovereign risk, which the CNB is starting to monitor more closely. The existing EU regulatory framework gives

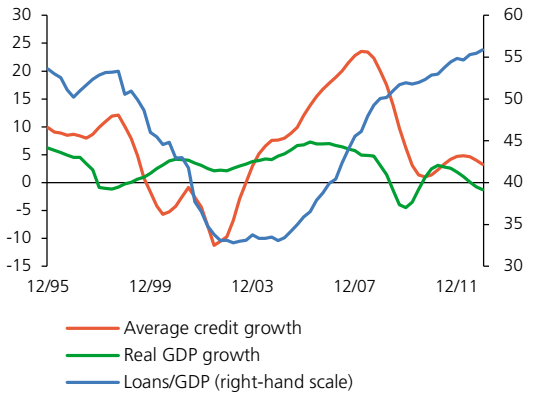
authorities little room to apply preventive approaches to sovereign risk.[4] The Czech Republic's current fiscal situation is sustainable and sovereign risk does not pose a threat to financial stability at the moment. Nonetheless, one can speak of increased concentration risk in some banks in this regard. Banks have a general obligation to manage this type of risk. Unlike other exposures, for which the exposure limit is set at 25% of capital, exposure to sovereign risk is not capped in the EU. In addition, sovereign exposures are a source of liquidity risk, as maturity transformation increases with rising volumes of government bonds and there is a danger of it becoming excessively high. In other words, banks that have mostly short-term liabilities should invest in long-term assets only to a sustainable extent. To mitigate the sector's concentration and liquidity risks, the regulator can, where necessary, require banks to cover such risks with additional capital under Pillar 2.

In addition to sovereign risk, the government bond portfolio is exposed to market risk. Flight-to-quality or flight-to-liquidity effects can emerge on government bond markets at times of financial market stress. As a result, prices of government bonds can record excessive upward deviations. This gives rise to a specific bubble. At some point, investors may reappraise the situation or change their opinions about a particular economy and about the quality of its government bonds. Demanded yields may increase significantly and government bond holders may thus incur market losses. According to the assessment in section 3.1, markets may not be assessing sovereign exposure risk in numerous countries – including the Czech Republic – entirely effectively, and so the yields demanded on government bonds may be unsustainably low over the long term. As a result, the capital requirement for the general interest rate risk of the trading portfolio under Pillar 1 may be too low.[5] If the regulator decides that this is the case, it can impose an increase in the capital requirement under Pillar 2 on the basis of stress tests.

4 See the thematic article *Fiscal Sustainability and Financial Stability* in this Report.
5 This type of procyclicality applies only to the trading portfolio (or the portfolio of assets revalued to fair value against Profit & Loss), as bonds held to maturity (HTM) are not revalued and the impact of revaluation of the available-for-sale (AFS) portfolio is "filtered off" for regulatory capital purposes.

CHART V.9

Credit cycle in the Czech Republic
(1995–2012; %)



Source: CNB

5.4 THE COUNTERCYCLICAL CAPITAL BUFFER AND ITS SETTING IN THE CZECH REPUBLIC

In reaction to the Basel III regulatory framework, CRD IV and CRR (hereinafter referred to jointly as CRD IV) introduced a new macroprudential element into EU regulatory practice: a countercyclical capital buffer. This tool is intended to respond to the risks associated with the cyclical behaviour of the banking sector, in particular strong fluctuations in lending, which magnify swings in the economic cycle. Banks should create such a buffer on the instructions of the regulatory authority at times of excessive credit growth, which are usually characterised by rising financial imbalances and the accumulation of systemic risk as a result of strong credit expansion. The capital buffer should then be "released", i.e. used by banks as an actual buffer, at times of economic downturn accompanied by heightened financial tensions and rising loan losses, when it becomes necessary to prevent a credit crunch and transmission of further shocks from the financial sector to the real economy. Overall, the countercyclical capital buffer has the potential to increase the resilience of the banking sector and reduce banks' tendency to alternate between periods of too easy and too tight credit conditions. This section outlines some methodological options for setting the countercyclical capital buffer in the Czech Republic, taking into account that the traditionally used credit cycle indicators have limited information value in the Czech economy owing to the limited length of the relevant time series and the existence of trends specific to converging economies.

In its original methodology for setting the countercyclical capital buffer, the Basel Committee on Banking Supervision proposes that excessive credit growth in a country should be assessed on the basis of the deviation of the time series of the total credit-to-GDP ratio from its long-term trend (the credit-to-GDP gap). This trend should be estimated using the Hodrick-Prescott (HP) filter. Practical problems with the application of this recommendation were discussed in detail by Geršl and Seidler in a thematic article in FSR 2010/2011. These problems stem from the properties of the HP filter and the credit-to-GDP ratio and from the aforementioned length of the time series.[6] Owing to the clean-up of bank credit portfolios following the 1998–2002 crisis, which was reflected in a non-cyclical fall in the credit-to-GDP ratio, the information value of the recommended indicator is low for this period in the Czech Republic, so the possibility of using the full available time series is limited (see Chart V.9). This section therefore uses the data from 2002 onwards, although the data starting in 1995 are also given for illustration and comparison.

Although the credit-to-GDP ratio may generally be an appropriate primary indicator for identifying signs of excessive borrowing in an economy, it is also important to concentrate on the rate of credit growth

6 These problems are usually faced mainly by countries that have been through a process of economic transformation.

itself when assessing the credit cycle in a country. Rapid growth in loans can easily lead to substantial accumulation of risks, as loans are provided to a greater extent to less credible debtors and riskier projects in this phase of the cycle. The setting of the countercyclical capital buffer must therefore take into account not only the credit-to-GDP ratio, but also the credit growth rate and other indicators that are relevant from the perspective of risk accumulation over the financial cycle. This approach should also be applied to the setting of countercyclical capital buffers under the new CRD IV rules.

It is quite difficult to find suitable indicators that can be used to identify rising credit risk in banks' balance sheets, as the traditional risk indicators (e.g. the NPL ratio) often improve at times of optimistic expectations and strong lending activity and do not rise (deteriorate) until risks actually materialise. Deviations of some indicators from their long-term averages or trends (e.g. property prices, credit margins) and qualitative indicators obtained from bank lending surveys are considered appropriate indicators of this type.[7] Past analyses based on data in the Czech Republic suggest that to construct appropriate indicators it is also possible to use individual data from the Central Credit Register (CCR), which provides up-to-date information about bank loans granted to non-financial corporations. While the CCR data do not cover loans to households, which represent a large share of the credit market, the corporate sector usually reacts to economic developments faster than the household sector.

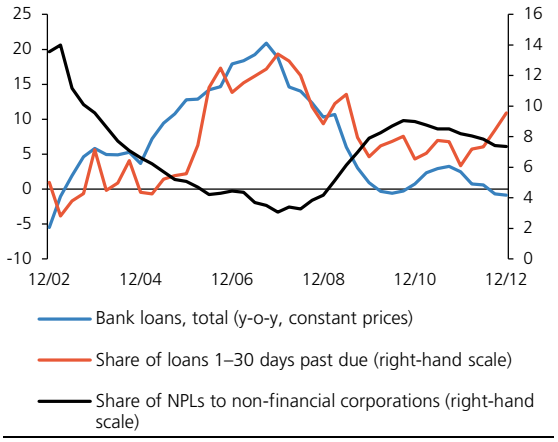
One potential indicator is the share of loans past due for 1–30 days in the total number of loans to non-financial corporations. This indicator contains information about the number of days past due for individual loans provided and is thus not burdened by banks' subjective assessments of the extent to which loans are risky.[8] It also indicates growth in risks more than one year ahead of the traditional NPL ratio (see Chart V.10). At the same time, this indicator is closely correlated with real credit growth, in line with the findings of numerous studies that excessive credit growth is a reliable early warning indicator of future problems in the banking sector.[9] This supports the prevailing view that identifying the credit cycle or excessive credit growth is closely linked with finding appropriate risk accumulation indicators.

In the search for indicators of this kind, attention was therefore also paid to credit growth, which was analysed using the Markov-Switching (MS) model in order to identify the probabilities of various phases of the credit

CHART V.10

Growth rates of loans and risk indicators

(%)



Source: CNB
Note: Share of number of past-due loans to non-financial corporations in total number of loans to non-financial corporations.

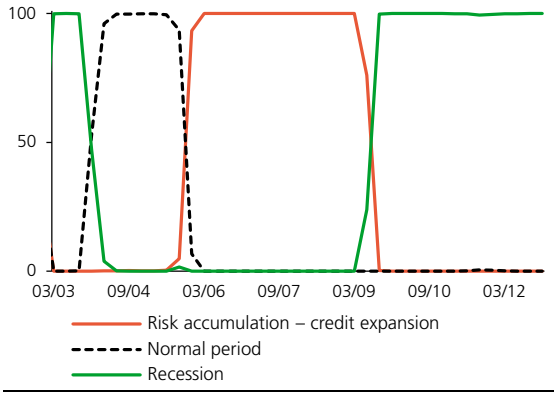
7 A list of leading indicators is given, for example, in Frait, J., Komárková, Z. (2012): *Macroprudential Policy and Its Instruments in a Small EU Economy*, Czech National Bank Research and Policy Note No. 3/2012, Table 2, p. 20.

8 The traditional NPL classification is based not only on information about the number of days past due, but also on the bank's subjective assessment of a debtor's quality. This leads to a situation where more than 43% of all loans classified by banks as NPLs are repaid on time (see section 4, Table IV.1).

9 See, for example, Björksten and Drehmann (2009): *Assessing the Risk of Banking Crises – Revisited*, BIS Quarterly Review, March 2009, pp. 29–46, or Babecký et al. (2012): *Early Warning Indicators of Economic Crises: Evidence from a Panel of 40 Developed Countries*, CNB WP 8/2011.

CHART V.11

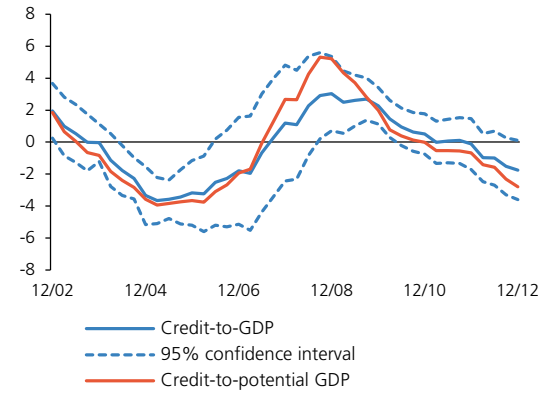
Probability of individual phases of the credit cycle
(%)



Source: CNB calculation

CHART V.12

Credit gaps with alternative denominators
(percentage points)



Source: CNB calculation

cycle, i.e. excessive growth (credit boom), normal growth and recession.[10] The results suggest a high probability of excessive credit growth in the Czech Republic starting at the beginning of 2006 (see Chart IV.11). This is consistent with the growth in risks in banks' balance sheets in terms of the above indicator of non-performing loans 1–30 days past due. However, the problem with approaches based solely on information about the credit growth rate is that they do not take into account sustainable growth in productivity, which can reduce the riskiness of high credit growth. For this reason, potential GDP growth was also included in the MS model as an explanatory variable, but the results remained qualitatively similar (see Table V.2, indicators 6 and 7).

The limitations associated with calculating excessive borrowing solely on the basis of the credit-to-GDP ratio also stem from the fact that a rapid decline in GDP during a recession increases the credit-to-GDP ratio and may indicate an excessive borrowing phase purely as a result of a more persistent credit cycle. The problem is partly mitigated if potential GDP, which is more stable, is used to calculate the credit indicator, but the results are little changed in terms of identifying periods of excessive credit growth compared to the traditional calculation (see Chart V.12). Nevertheless, when determining the gap between the current credit-to-GDP ratio and its trend, it is useful to take into account the uncertainty associated with the HP filter estimate. Using the 95% confidence intervals for the estimated gap, it is apparent that the upper confidence limit does not rule out the emergence of excessive growth as early as the end of 2006.

Although the HP filter method for calculating the trend has numerous limitations, it has the virtue of being relatively intuitive to interpret. The methodology can be extended by including other variables in the HP filter to capture the build-up of risks over the credit cycle (for example the above-mentioned indicator of loans 1–30 days past due). In this case, in addition to the traditional restrictions produced by the HP trend, the credit cycle is determined in such a way as to track the above-mentioned accumulation of credit risk as closely as possible.[11] In contrast to the traditional HP filter method, these results identify a phase of excessive credit activity starting in mid-2006. Besides NPLs, it is possible to use other variables related to the creation and accumulation of risks due to excessive lending, e.g. property price growth indicators.

The aggregate Table V.2 shows the periods in which credit growth was identified as excessive based on the methods discussed in the text. The results show that the traditionally recommended method for estimating excessive credit growth and calibrating countercyclical buffers may deliver wrong conclusions for the Czech Republic regarding the phase/timing of

10 See Kelly et al. (2011): *Exploring the Steady-State Relationship between Credit and GDP*; a similar methodology was used in Anguren-Martín (2011): *Credit Cycles: Evidence based on a Non Linear Model for Developed Countries*.

11 This method is known as the Hirose-Kamada filter. It was originally used to estimate potential output and the output gap. In that case, the output gap was determined so as to explain inflation in the best possible way.

the credit cycle. When applied to the data starting in 1995, this method even indicates excessive credit growth for the entire crisis and post-crisis period. By contrast, some minor adjustments to the methodology and the other analytical tools used deliver results that are more intuitive, i.e. that excessive credit growth was recorded in the Czech Republic in 2006–2008, with year-on-year real growth rates of around 20%.

Setting a non-zero countercyclical capital buffer and determining its level in a systemic risk accumulation phase is only one of the stages of the analytical and decision-making process. The CNB will have to consider which procedure to apply when the credit market situation is no longer creating conditions for a further rise in systemic risk. In this situation, it will be necessary to assess whether it is possible to reduce the existing setting of the buffer, and, if so, to what extent. A specific challenge will be to determine the moment when it is necessary to allow the buffer to be released fully. A different set of indicators will have to be used for this task than for the introduction of the buffer, in this case indicators of the materialisation of systemic risk, including quickly available indicators of developments in financial markets. The release of the buffer will also differ procedurally from the introduction of the buffer. When a non-zero buffer is introduced, banks will be given time to adjust and gradually increase their capital, whereas the regulatory authority's decision to reduce the buffer will apply immediately and banks will be able to release capital to the given extent immediately.[12]

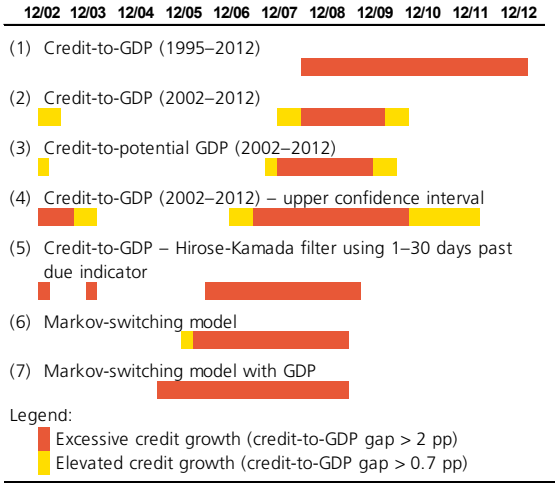
Overall, the settings of countercyclical capital regulation will be based on determining the phase of the credit cycle. In a situation of time series of limited length, it will be necessary to assess numerous indicators, indicators that monitor not only credit growth, but also the overall situation in the credit market connected with the accumulation of risks in the financial sector. At the same time, it will be necessary to take into account a situation where credit growth is very mixed across sectors (e.g. limited to growth in mortgage loans only). So, the setting of the buffer cannot be a mere mechanical exercise, but must be based on a detailed expert assessment of developments in both the real economy and the financial sector. The CNB should thus follow the practice previously introduced in this area by, for example, the Swiss central bank, which applies guided discretion to the setting and release of buffers.

From the assessment of developments in the domestic economy presented above it is clear that the current phase of the credit cycle in the Czech Republic does not necessitate the creation of a countercyclical buffer in the banking sector. The outlook for the overall credit growth rate in the *Baseline Scenario* additionally suggests that it will probably not be necessary to create countercyclical capital buffers over the next few years either. The CNB could respond to emerging partial imbalances in the credit market by applying other macroprudential tools, for example by increasing the sectoral risk weights or setting a tighter LTV ratio.

12 The release of countercyclical buffers is described in detail in Frait, J., Komárková, Z. (2012): *Macroprudential Policy and Its Instruments in a Small EU Economy*, Czech National Bank Research and Policy Note No. 3/2012 (Table 3 and Figure 7, pp. 21–22).

TABLE V.2

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



Source: CNB
Note: For the MS model, excessive credit growth was defined as a probability of a credit expansion phase of greater than 95% and elevated credit growth as a probability of greater than 85%.

5.5 REGULATION OF RISKS ASSOCIATED WITH EXPOSURES TO THE PROPERTY MARKET

Other macroprudential tools can be used to reduce the cyclical behaviour of the financial sector. First, authorities can react to risks associated with loans for house purchase or for financing property (both residential and commercial) using traditional capital regulation tools. Pillar 2 already allows national supervisors to impose higher sector risk weights to credit segments displaying increased accumulation of risks. Banks would thus have to create a larger capital buffer for such loans. As from 2015, the CRD IV package (see section 5.7) will allow national supervisors to apply – under Pillar 1 – higher sector risk weights to the residential and commercial property segments based on systemic risks identified, as well as to tighten certain criteria or increase the LGD. This also implies a requirement to create a larger capital buffer for such risks.

The second main tool is to set a cap on the loan-to-value (LTV) ratio for individual house purchase loans. This is one of the principal macroprudential tools recommended by the ESRB (see section 5.7). LTV limits and increased sector risk weights can be considered complementary tools, as they act via different channels. Capital regulation represents a constraint on the bank, as it requires it to keep a larger amount of capital for loans with higher risk weight, whereas an LTV limit represents a constraint on the debtor's borrowing capacity. In connection with the ESRB recommendation and the introduction of the new CRD IV rules, the CNB will deal with LTV limits and sector risk weights in more detail in future years.[13]

The setting of LTV limits is aimed at reducing excessive accumulation of risks in the banking sector stemming from insufficiently prudent provision and acceptance of loans for house purchase. In some phases of the credit cycle, both banks and households may underestimate the future risks, and banks may be too benevolent about households' potential inability to repay. This benevolence may be caused by the seemingly high value of collateral in the form of property at times of high inflation. Such a situation often arises in periods of interconnected credit and property booms and leads to excessive household borrowing and the accumulation of loans with an elevated probability of default in banks' assets. In the event of a sharp deterioration in the macroeconomic conditions, these accumulated risks materialise as defaults and subsequent forced sales of property among households, and as rising loan losses among banks.[14]

LTV limits can be either fixed or moving, depending on the current phase of the cycle, with the aim of causing a countercyclical effect. A lower LTV

13 The potential introduction of LTV limits or higher sector weights for banks operating in the Czech Republic would be preceded by detailed analyses evaluating the credit cycle in the Czech Republic, potential volatility of property prices, the current LTV distribution and also the experience of other countries.

14 At the aggregate level, foreclosures can put additional downward pressure on property prices above and beyond the deterioration in fundamentals.

(i.e. a stricter limit) can be used during very strong credit booms and a higher LTV (a less strict limit) at other times. LTV limits can also be applied differentially according to the type of loan and the type of property pledged (e.g. lower LTV limits for foreign currency loans and loans for speculative property purchases).[15]

LTV limits are not applied to individual loans in the Czech Republic at present, nor is there any immediate need to do so.[16] Neither the property market (see section 3.2) nor the mortgage loan market is currently showing any major signs of overheating. At less than 60%, the aggregate LTV for mortgage loans for the entire banking sector is relatively low (see Chart V.13). The microeconomic data also indicate that there is no significant property price credit channel, which LTV limits are intended to weaken.[17]

Despite this, many advanced countries, although being in a similar situation to the Czech Republic at present, apply LTV limits to individual loans. One of the main reasons is the limited information content of aggregate LTV data. This can also be illustrated on the case of the Czech Republic. The end-2012 data suggest that there are large differences between banks in terms of their aggregate LTV ratios, but banks with the largest market shares are reporting LTV ratios close to the sector average. The market share of all banks reporting LTV ratios below 65% is 90%. However, the remaining banks have relatively high LTVs (see Chart V.14).

The disadvantage of the above comparison of aggregate LTV ratios is that a bank may have in its portfolio a large amount of "safe" mortgages with a very low LTV and, on the other hand, a large number of more risky mortgages with a high LTV. If banks start providing a large number of new mortgages with a high LTV, the information on the aggregate LTV ratio would not directly reveal such risks, since the average LTV would for a time rise only slowly and indicate a low level of risk.

The above problem of aggregation is confirmed to some extent by data illustrating the proportion of house purchase loans to households with an LTV above 100% for individual banks (see Chart V.15). Obviously, even banks with the highest market shares have a relatively large volume of loans to households that are not at least 100% collateralised by real estate. However, this is not clear from the above aggregate values. This suggests that loans with a high LTV may account for a significant proportion of some banks' portfolios.

15 LTV caps are applied to individual mortgage loans in numerous advanced countries. At the end of 2012, almost 20 EU countries had some form of LTV tool. Outside the EU, such limits are used in Canada, Norway and Israel. Although the limits differ depending on the specifics of individual economies, they usually lie in the range of 80–100%.

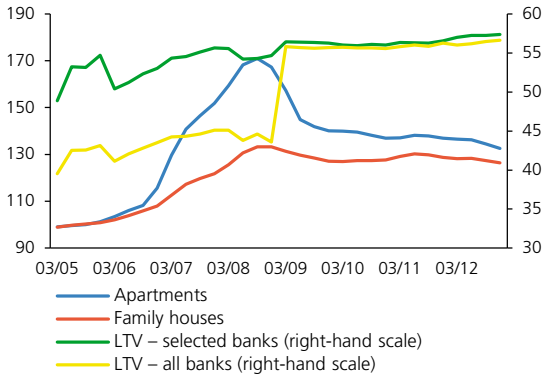
16 LTV requirements already exist in the current regulatory framework, but only at the aggregate level, for the purposes of mortgage bond issues and for the application of preferential risk weights in capital requirements.

17 See the thematic article *Impacts of Housing Prices on the Financial Position of Households* at the end of this Report.

CHART V.13

Comparison of LTV ratios and property prices

(%; property prices: basic index 2005 = 100)



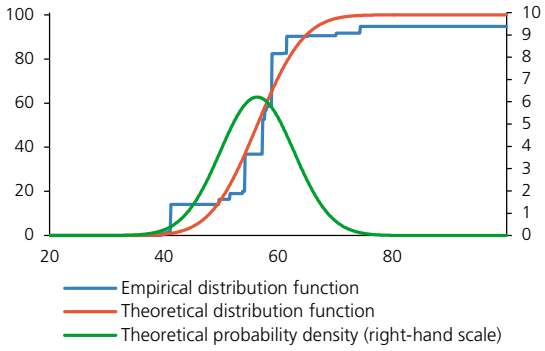
Source: CNB, CZSO

Note: Property prices are transaction prices. The data for 2012 are preliminary estimates or are calculated from alternative data sources. The selected banks are all banks (other than building societies) with a market share of more than 1%.

CHART V.14

Cumulative distribution function of LTV

(%; as of 31 December 2012; x-axis: LTV on mortgage loans to households)



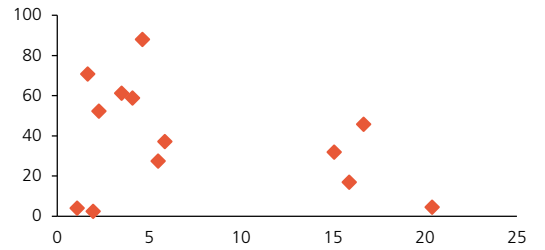
Source: CNB

Note: Empirical cumulative distribution function calculated from LTV data for individual banks. The theoretical normal distribution function is chosen so as to have the smallest deviation from the empirical distribution function.

CHART V.15

Proportion of property purchase loans provided by the bank to households with an LTV above 100% as of 31 December 2012

(x-axis: market share of bank in %, y-axis: proportion of loans with LTV above 100%)



Source: CNB

Note: Banks with a market share in loans provided to households of less than 1% are excluded. 100% LTV ratio according to the real or market value of the collateral available at the time of reporting and the relevant nominal value of the loan.

A comparison of LTV ratios and property prices (see Chart V.13) shows that the aggregate LTV ratio calculated from the stock of mortgage loans for house purchase is rather unresponsive to property prices, which were quite volatile in past years, particularly in the case of apartment prices. The only exception was a surge in the LTV ratio of about 12 pp at the start of 2009, although this was mainly due to a methodological change in the reporting of mortgage loans.[18] The LTV in most banks rose only gradually and at a much slower pace than property prices. The LTV ratio showed practically no response to declines in property prices in 2010–2012 (5.3% for apartments and 0.6% for family houses). This would suggest that property valuation is not necessarily unified across the banking sector and does not necessarily reflect the current property market situation to a sufficient extent.

18 Property prices also fell quickly in the same period (by 16.3% and 4.6% year on year for apartments and family houses respectively).

5.6 REGULATION OF SYSTEMICALLY IMPORTANT INSTITUTIONS

The CRD IV directive (see section 5.7) allows the national regulator to set regulatory requirements for domestic financial institutions on the basis of their size and importance, and therefore also on the basis of the impact their collapse would have on the stability of the financial sector and the economy as a whole. The purpose of this regulation is to estimate the systemic importance of each institution and set rules that will reduce its risk of collapse and motivate it to reduce its systemic importance.

According to CRD IV, additional capital requirements, i.e. capital buffers or capital surcharges, are a key tool of this type of regulation. The abbreviations G-SII (global systemically important institution) and O-SII (other systemically important institution) are used in this context. Only O-SII buffers are relevant to the Czech financial sector.

Besides the O-SII buffer, which should correspond in size to the systemic importance of the institution, CRD IV introduces another buffer – a systemic risk buffer – which can be applied to a whole group of institutions or a suitably defined subset of the financial sector. It is meant to suppress long-term non-cyclical systemic and macroprudential risks that cannot be adequately suppressed by standard regulatory tools.

In most countries and international forums, the plans to implement capital buffers are at a most advanced stage in the area of bank regulation. Given the dominant role of banks in the Czech financial system and the high concentration of the Czech banking sector, the CNB is ready to apply O-SII capital buffers to banks in the near future.[19] The methodology described in the thematic article *An Additional Capital Requirement Based on the Domestic Systemic Importance of a Bank*, potentially supplemented with other relevant indicators and procedures, can serve as an analytical basis for determining which banks this requirement should apply to and to what extent.

The CNB will inform banks and the public in advance about the banks to which capital buffers will be applied and about the amounts of those buffers. It should be stressed, however, that even if such buffers will be based on the systemic importance of individual banks, the setting of a non-zero additional capital requirement for a particular bank should not be regarded as a signal that this bank will be rescued by the state if it runs into difficulties. Decisions on bank bailouts will always be based on an assessment of the prevailing situation.

19 The O-SII buffer for banks in the EU reflects the original BCBS proposal that selected banks should maintain a D-SIB (domestic systemically important bank) buffer.

5.7 THE EUROPEAN REGULATORY ENVIRONMENT AND THE RISKS OF THE BANKING UNION

The ESRB has issued a recommendation on the objectives of macroprudential policy and appropriate tools for achieving them

EU bodies made progress last year with mapping out a set of tools for use in the conduct of macroprudential policy. Most of this work was done in the European Systemic Risk Board (ESRB). The result is ESRB Recommendation No. 1/2013, which is based on five key macroprudential policy objectives: (a) dampening excessive credit growth; (b) suppressing excessive maturity mismatches and market illiquidity; (c) containing excessive concentration of direct or indirect exposures; (d) mitigating the systemic effects of inappropriate incentives in order to curb moral hazard; and (e) strengthening the financial infrastructure.

The ESRB advised EU countries to verify whether their institutions responsible for macroprudential policy have an appropriate set of tools. The ESRB recommendation states that a macroprudential authority should directly control at least one tool for fulfilling each of the above five objectives. The tools that can be used if the country has the relevant legal and other prerequisites in place include, for example, capital surcharges (changing in time or differing across types of financial institutions, or both), requirements for sufficient liquidity, limits on the concentration of relationships with individual counterparties or inter-linked groups, LTV limits and maximum leverage ratios.

The range of macroprudential tools is wide. Individual countries will in practice focus on a narrower set of tools suiting the structure and nature of the domestic financial system and the existing legislative and regulatory environment. Further to this debate at the European level and the resulting ESRB recommendation, the CNB, which is tasked with maintaining financial stability in the Czech Republic, is also working on macroprudential policy objectives and appropriate tools. Its approach is based on the fact that the Czech financial sector is dominated by banks, whose main activity is to provide loans to non-financial corporations and loans for house purchase and to finance the domestic public sector. The CNB will also take into account the fact that the Czech financial sector consists largely of institutions wholly or majority-owned by foreign financial institutions subject to regulation and supervision by foreign authorities. The preceding parts of this section examine the options for using certain tools, such as the countercyclical capital buffer, capital surcharges based on the institution's domestic systemic importance, LTV limits on loans for house purchase and tools focused on sovereign risk.

A new regulatory framework – CRD IV/CRR – has been adopted for banks in the EU

In the first half of 2013, following long and complex negotiations, two major pieces of legislation were adopted stipulating rules for the regulation of banks and some other financial institutions. These transpose into EU legislation a set of Basel Committee on Banking Supervision (BCBS) recommendations known as Basel III. They are known simply as

the Capital Requirements Regulation (CRR) and the Capital Requirements Directive (CRD). In reality, however, both deal not only with the traditional regulation of the ratio of capital to risk-weighted assets (RWA), but also with some other issues. Whereas the CRR is completely new, the CRD is the fourth version and is sometimes called CRD IV. The two documents are sometimes referred to as the CRD IV package or just CRD IV. This package is of crucial importance from the macroprudential policy perspective because it allows the authorities in individual EU countries to apply several new macroprudential tools.

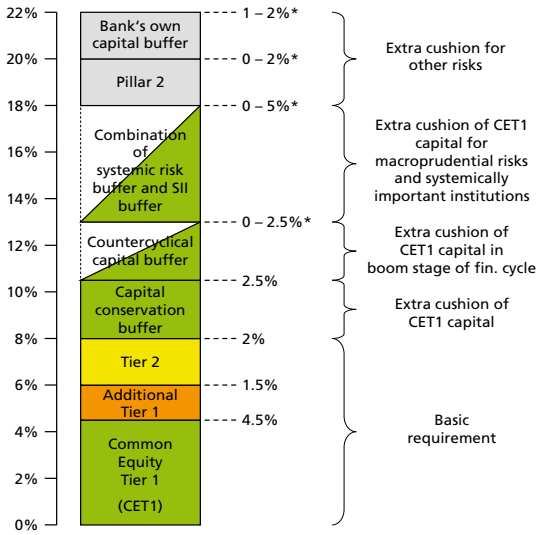
The distribution of individual provisions into the CRR and the CRD is significant from the legal point of view: whereas a regulation automatically becomes a direct part of the law of all EU countries after it is approved by the European Council, the content of a directive must be transposed by the countries into their laws through the domestic legislative process. For this transposition, European law lays down the principle of "minimum harmonisation", according to which regulations may be tightened further but may not be eased when the content of a directive is transposed into domestic law.

In the area of capital regulation, the CRR incorporates the BCBS proposal to require banks to hold a minimum capital buffer of 4.5% of RWA in the form of Common Equity Tier 1 (CET1). The CRD contains additional requirements (see Chart V.16). First, each bank has to hold a capital conservation buffer of 2.5% of RWA in the form of CET 1. Banks may cover losses using this buffer in bad times without being threatened with licence revocation, but they must observe certain restrictions, for example on dividend payments, until they have restored the buffer. Second, the regulator may require a subset of the banking sector or individual banks to hold CET 1 capital in several other – this time macroprudentially tuned – types of buffers (a systemic risk buffer, a buffer derived from the global or domestic systemic importance of the bank, a countercyclical buffer). The consequences of drawing on these buffers without them being released by the macroprudential authority are the same as for the conservation buffer.

The CRR also regulates the leverage ratio (the assets-to-GDP ratio) and a further two aspects that are significant from the perspective of the prudential operation of the institutions concerned – it sets limits on large exposures and lays down liquidity requirements. The liquidity rules, however, are defined in relatively general terms at the moment, and the CRR leaves room for them to be specified in more detail. The CRR and the CRD will take effect on 1 January 2014. However, where they introduce new types of regulation or tighten existing regulations, they set various transition periods during which the regulations will gradually take their final form. So, in the period ahead it will be necessary to conduct an in-depth analysis of all the possibilities and limitations of this new legislative framework for bank regulation in both domestic and cross-border coordination of macroprudential policies. However, some elements of the banking union project may substantially hinder the conduct of macroprudential policy. This issue is analysed in the final box of this report.

CHART V.16

Capital requirements stipulated by CRD IV
(in % of risk weighted assets)



Source: European Commission (adapted)
Note: * Expected upper limits, although actual values can be higher.

BOX 2 – THE BANKING UNION, MORAL HAZARD AND RISKS TO FINANCIAL STABILITY

Box 1 in section 4 describes the risks to the banking union project associated with the proposed transfer mechanisms and the application of the group interest principle. Besides these risks, however, there are other risks stemming primarily from greater moral hazard. Although the banking union project is being presented as a tool for preventing major financial crises in the EU in the future, its main purpose – at least in the initial phase – was to reduce the threat of a dramatic escalation of the current crisis and the disintegration of the euro area. This is meant to be achieved by disrupting the links between national governments and national banking sectors by transferring government debts and potential bank losses to the euro area or EU level. In addition to the political risks described below, this approach has considerable potential to increase moral hazard, as it opens up the possibility of poor-quality government or private assets being transferred from entities in specific countries to public balance-sheets and taxpayer liabilities in other countries. If it is expected that bailouts of troubled countries will be financed from public funds, the potential magnitude of the bailouts and debts requiring common financing will increase. The aggregate level of public debts and potential banking sector losses that will require the involvement of public budgets is already relatively high in the euro area and is approaching a level which may give rise to doubts about its sustainability. In addition, many governments are unable to reduce their public budget deficits at the previously expected rate. This is being reflected in considerable issuance activity and rising exposure of financial institutions to the public sector. This rising exposure is also being supported by the preferential regulatory approach to government bond holdings and by rising public confidence that the euro area will jointly prevent sovereign credit defaults, even at the expense of monetary financing of public budgets.

The separation of the state from the national financial system may also increase moral hazard through weaker responsibility of national governments for long-term fiscal sustainability. If government bonds are held primarily by national banks or pension funds, politicians may feel responsible for the public's money in these institutions. Any threat to such funds would also make them less likely to be re-elected. If government bonds are held by "anonymous" investors on the opposite side of Europe as a result of greater EU financing of government debt, ill-considered fiscal expansion may be easier and sometimes even rational. If, however, a shock occurs in this environment in the

form of an unexpected rise in sovereign risk in respect of a specific issuer, the impacts of this shock will be EU-wide, not local.

The risks described above may have a direct effect on the common deposit insurance fund, if it is established. Neither the existing national funds nor the future common fund is likely to be large enough to resolve major financial crises and will have to rely on coverage by public budgets in the form of either guarantees or cash. If it becomes necessary to use money from the single fund to a greater extent, this will again give rise to expectations that strong countries will have to increase their public debts to help weaker countries, and sovereign risk may thus start to rise again in the euro area as a whole. In such case, the banking union will act as an accelerator of, rather than a barrier to, the spread of systemic risk. A major complication in this regard is that there is currently no fiscal union in the euro area, and this is not likely to change in the next few years. And even if some form of fiscal union is established, it will be exposed to the risk that political processes will develop at national level which will undermine the consensus in the EU and thwart the commitment to finance the debts of troubled countries over the long term. To sum up, the assumption that the banking union will disrupt the link between national governments and national banking sectors is not entirely credible.

The building blocks of the banking union presented so far are often based on principles that are not consistent with the present political and economic arrangements in the EU. The expectations that the feedback between sovereign risk and credit risk will be eliminated in this way may therefore prove to be another blind alley that will prolong rather than stop the crisis. The proposals to establish a banking union are thus focused on past problems stemming from inherent problems in the very nature of the present monetary union. These problems include, for example, structural differences between the core and periphery of the euro area, business cycle misalignment between countries, and differences in the reactions of economies to external shocks. These proposals thus again treat only the symptoms, not the cause, of the "disease". The idea that the banking union is the "one and only" solution may imply a strengthening not only of moral hazard, but also of contagion channels across countries.

Additional risks to financial stability stemming from the current ideas about the functioning of the banking union are associated with the separation of national governments and national

supervisory authorities from responsibility for the overall situation of the national financial sector. This may further intensify the possibility of financial imbalances, the correction of which often requires a fast and decisive response through a combination of supervisory, macroprudential and fiscal measures to prevent the emergence of dangerous asset market bubbles. If a national government does not feel fully responsible for the domestic banking sector, it has less incentive to contribute to unpopular measures aimed at correcting emerging imbalances. Even more importantly, the banking sectors in the EU differ widely in terms of size, indebtedness, cross-border operations, concentration and dominant types of bank and customer behaviour. Financial cycles differ considerably as well. Ireland and Spain experienced strong credit booms before the crisis, whereas Germany and Austria did not. Given this heterogeneity, there are concerns that single supervision and single rules will hinder effective macroprudential policy, and in particular the ability to prevent local credit booms followed by distress in national banking sectors. The final result may be the unification not only of euro area interest rates, but also of lending conditions. This would preclude the implementation of effective countercyclical policy at the national level.

PART II – THEMATIC ARTICLES

AN ADDITIONAL CAPITAL REQUIREMENT BASED ON THE DOMESTIC SYSTEMIC IMPORTANCE OF A BANK

Michal Skořepa and Jakub Seidler

This article is concerned with the regulation of banks on the basis of their different degrees of systemic importance. It proposes a specific approach to calculating a bank's systemic importance to the domestic banking sector. The article goes on to propose a method for assessing the additional capital requirement for a bank based on the estimated cost impacts of failure of the bank on the Czech financial sector and the economy as a whole. The proposed approach is used to obtain systemic importance scores and capital buffers for individual banks in the Czech Republic. According to the calculations, the highest capital buffer is 4%. However, a non-zero capital buffer should not be interpreted as a signal that the bank is too big to fail and would therefore be guaranteed a public bail-out if it got into difficulties.

1. INTRODUCTION

The financial crisis in recent years has reignited the debate on how financial sector regulators should take into account the size and significance of financial institutions and thus also the impacts that their failure would have on the stability of the financial sector and the economy as a whole. This debate has led to efforts to estimate the systemic importance of individual institutions and, based on the results, to set regulations that reduce an institution's risk of failure and motivate it to reduce its systemic importance itself.

Given how the financial crisis unfolded, attention was focused first on the banking sector, as it was the hardest hit area of the economy at the start of the crisis. In late 2011, the Basel Committee on Banking Supervision (BCBS) published a methodology for determining a bank's global systemic importance, i.e. the impact that its failure would have on the global economy. It also proposed actions that regulatory authorities should take against banks displaying extremely high global systemic importance.

In late 2012 the BCBS published a document containing rules for calculating a bank's systemic importance to the domestic economy. This publication, however, leaves the assessment of suitable regulatory actions against banks based on their domestic systemic importance to the competent home regulatory authority. As the Czech Republic is a member of the EU, the key factor as regards regulation based on systemic importance will be the form in which these BCBS guidelines are incorporated into the regulatory legislation of the EU, specifically the directive and regulation on capital adequacy.

Komárková at al. (2012) applied a slightly modified version of the BCBS methodology for measuring the global systemic importance of banks to the Czech banking sector. The present article is a follow-up to that study and proposes an approach to determining the domestic systemic importance of individual banks and setting appropriate additional capital requirements on the basis of the systemic importance scores obtained. It then applies this approach to the Czech banking sector.

The calculation results are described in this article in a way that makes it impossible to identify individual Czech banks. The method proposed in the article is designed for use as an analytical basis for future decision-making at the CNB on what additional capital requirements individual banks in the Czech Republic should meet on the basis of their systemic importance. However, it is not a final methodology: when deciding on which banks to apply a D-SIB buffer to, and how large the buffer should be, the CNB may take into account indicators and approaches other than those proposed in the article.

The article is structured as follows. Section 2 summarises the principles of the BCBS proposals for the regulation of systemically important institutions. The following two sections describe ways in which the BCBS proposals could be applied to the Czech financial sector. Section 5 summarises the results obtained, Section 6 verifies those results and Section 7 briefly describes the general relationship between systemic importance and "too big to fail" status. Section 8 summarises the main findings.

2. REGULATION BASED ON THE SYSTEMIC IMPORTANCE OF BANKS: CURRENT SITUATION

The BCBS distinguishes two types of systemic importance of a bank: the degree to which it is systemically important to the global economy (hereinafter its "G-SIB score") and the degree to which it is systemically important to the domestic economic system (hereinafter its "D-SIB score"). Theoretically, various combinations of G-SIB scores and D-SIB scores can occur in different countries. In practice,

though, it can be assumed that most globally important banks are also important in the context of the domestic financial sector. However, the opposite does not apply, i.e. most domestically important banks will be of low global systemic importance.

The BCBS concentrated initially on developing a proposal to regulate banks with high G-SIB scores. According to BCBS (2011b), such scores should be based on five categories of indicators: (1) size, (2) interconnectedness, (3) substitutability, (4) complexity and (5) cross-jurisdictional activity.

BCBS (2011b) also defines a specific method for calculating G-SIB scores so as to ensure that they are comparable and uniformly interpreted across the world. Komárková et al. (2012) gives more detailed information on how to calculate G-SIB scores.

BCBS (2011b), in combination with another regulatory document FSB (2011), then defines two regulatory requirements for banks based on their G-SIB scores. First, a resolution and recovery plan should be drawn up for banks whose G-SIB score exceeds a certain threshold. Second, each bank should be subject to an additional capital requirement functioning as a "capital conservation buffer" (see BCBS, 2011a). This G-SIB capital buffer should be derived from the bank's G-SIB score.

After defining an approach to calculating G-SIB scores and related regulatory requirements, the BCBS turned its attention to the issue of determining banks' D-SIB scores and related requirements. The results are summarised in BCBS (2012), which proposes a similar approach to calculating D-SIB scores as in the case of G-SIB scores, with just a few modifications. The main difference is obviously that D-SIB scores relate to the domestic, not the international, financial sector and real economy. The other major modifications for calculating D-SIB scores are the following:

- There is no explicitly defined method for calculating D-SIB scores, as international harmonisation is not necessary in this area (no specific indicators or weights are defined).

- The D-SIB score calculation will not be based on the bank's cross-jurisdictional activity. It will thus be based only on the first four categories of indicators listed above, i.e. size, interconnectedness, substitutability and complexity. Specifically for complexity, however, BCBS (2012) states explicitly that this may arise partly from cross-border activity.

- The D-SIB score calculation may also be based on other indicators that the domestic regulator deems relevant. For example, the document allows national authorities to use the bank's size relative to domestic GDP and its wholesale funding ratio. However, these indicators must be set with regard to the specifics of the national economy and financial sector.

Another important modification in the approach to domestic institutions with different degrees of systemic importance is the absence of a requirement to draw up resolution and recovery plans for individual banks exceeding a certain D-SIB score. In the context of D-SIBs it is sufficient to have a general (but practicable and effective) resolution plan enacted in the national legislation.

BCBS (2012) proposes to apply an additional capital requirement to any given bank based on its D-SIB score, i.e. a D-SIB capital buffer.[1] BCBS (2012) gives only a few general principles for the D-SIB buffer assessment methodology and expects domestic regulatory authorities to conduct their own analyses and to use them to tailor the methodology to national circumstances.

The fundamental parameters for the regulation of the banking sector of the Czech Republic – as an EU member – are laid down in union-wide legislation. The proposals tabled by the BCBS (2011b, 2012) should be broadly incorporated into the Capital Requirements Directive (CRD), specifically the fourth revision thereof, abbreviated as CRD IV. However, the final version of CRD IV was not known at the time of writing. Therefore, we will base our following considerations and calculations on the BCBS proposals and not on CRD IV.

3. METHOD FOR CALCULATING THE SYSTEMIC IMPORTANCE OF BANKS IN THE CZECH REPUBLIC

As indicated in the previous section, the additional capital requirement based on the systemic importance of a bank to the domestic economy is calculated in two steps:

(1) calculation of the D-SIB score for each bank,

(2) calculation of the D-SIB buffer for each bank.

We will start by briefly discussing the first step. The second step will be dealt with in Section 4.

1 If a G-SIB capital buffer also applies to the bank in question, the higher of the two values is used.

TABLE 1

CATEGORIES AND INDICATORS OF SYSTEMIC IMPORTANCE

Category	Indicator
Size	Total exposures
Interconnectedness	Claims on FIs
	Liabilities to FIs
	Wholesale funding ratio
	Concentration of claims on FIs*
	Concentration of liabilities to FIs*
Substitutability	Assets under custody
	Volume of payments cleared and settled through payment system
	Number of payments cleared and settled through payment system*
	Primary deposits*
	Loans provided to non-financial corporations*
	Size of Czech government bond portfolio*
Complexity	OTC derivatives notional value
	Held for trading and available for sale value
	Claims on non-residents
	Liabilities to non-residents
	Assets in regulated consolidated group*
	Number of organisational units*
	Number of employees*
	NPL-to-asset ratio*

Source: BCBS (2011b, 2012), CNB
Note: * denotes non-BCBS indicators.

In contrast to the G-SIB methodology, the BCBS does not go into detail on the indicators that belong to each category or on the method for calculating the D-SIB score itself. However, it is appropriate to use the international global systemic importance methodology as a basis and just tailor it to the domestic systemic importance context. The resulting list of indicators used in this article to calculate the D-SIB scores of individual banks is given in Table 1. The list differs from the G-SIB methodology only in a few minor respects; non-BCBS indicators are marked with an asterisk.[2]

As in the G-SIB methodology, an equal weight of 25% is given to each of the categories of indicators, with each indicator equally weighted within its category. For each bank, the score for a particular indicator is calculated by dividing the relevant accounting value for the bank by the accounting value for the banking sector as a whole; for indicators that are ratios we calculate the score for a particular bank by dividing the individual bank ratio by the aggregate ratio summed across all banks. The aim of this approach is to ensure that the score for each indicator for each bank lies between 0 and 1 and the sum of the scores for each indicator across all banks in the sample is equal to 1. This calculation gives the degree of systemic importance, i.e. the D-SIB score, for each bank in the sector. The sum of the D-SIB scores across all banks in the sector is thus equal to 1 by definition. The score obtained in this way for a given bank is then used to determine the bank's capital buffer based on its systemic importance.

4. ADDITIONAL CAPITAL REQUIREMENT CALCULATION METHOD

In line with the BCBS publications, we start with the following assumptions set out in Basel III when determining the capital buffer based on the D-SIB score:

(i) Each bank must meet a minimum capital requirement for Core Tier 1 capital (CT1) of k_{min} = 4.5% of risk-weighted assets.[3] CT1 is composed of common stock and retained earnings, i.e. capital that can be used immediately and unconditionally to cover any losses of the bank.

(ii) In normal circumstances, each bank additionally holds the full basic component of the CT1 capital conservation buffer[4] of k_{basic} = 2.5% of risk-weighted assets.

(iii) In normal circumstances, a bank with a D-SIB score equal to *sib* should comply not only with k_{min} and k_{basic}, but also with the D-SIB buffer, i.e. the full D-SIB component, *k(sib)*, of the CT1 conservation buffer.

Consequently, of the three components of the total CT1 capital requirements listed above, only *k(sib)* is sensitive to the bank's D-SIB score.

If the capital of the bank falls below $k_{min} + k_{basic} + k(sib)$, the bank must take remedial action whose intensity (and thus also the costs to the economy arising from the situation) is proportional to the decline in capital. In what follows,

2 In comparison with Komárková et al. (2012), some of the non-BCBS indicators have been chosen in an easier to interpret form (e.g. simple shares in the total are used instead of indicators based on network analysis of the payment system) and some additional indicators are also used (e.g. the size of the Czech government bond portfolio). As the set of indicators for the G-SIB calculation overlaps to a large extent with the set of indicators chosen in this article for the D-SIB score calculation, the resulting scores in this article (see Section 5) are relatively similar to those in Komárková et al. (2012).

3 Due to the inaccessibility of historical data on values of the Common Equity Tier 1 (CET1) capital, the present calculations were done using Core Tier 1 (CT1) capital. For the Czech banking sector, the difference between actual volumes of both types of capital is negligible.

4 We use the descriptor "basic" here because the total conservation buffer also includes a D-SIB buffer and a countercyclical buffer (where introduced).

the situation where, as a result of a large negative profit in the quarter, the bank's CT1 falls below the regulatory minimum k_{min}, i.e. it records a negative quarterly profit of $-[k_{basic} + k(sib)]$ or lower, will be referred to as distress (this need not mean a straightforward fall in the sense of a loss of licence). The probability $P(sib)$ of distress for a bank with a D-SIB score of *sib* is obviously lower for a higher D-SIB capital buffer $k(sib)$, i.e. for a higher level of *sib*. We denote the costs to the economy arising from the distress of a bank with a D-SIB score of *sib* as $C(sib)$.

The capital buffer is then determined on the basis of the "equal expected impact" principle. This principle can be generally expressed as follows: the expected costs to the economy resulting from distress of any bank that is systemically more important than a reference bank chosen by the regulator should be the same as the expected costs to the economy resulting from distress of the reference bank.[5]

According to the expected impact principle, the point of the D-SIB buffer is to reduce the probability $P(sib)$ of distress of the bank such that the *expected* costs of this situation, i.e. $C(sib)*P(sib)$, are equal to the expected costs of distress of the reference bank, i.e. $C(sib^R)*P(sib^R)$. It is obvious that the D-SIB buffer will be zero for the reference bank and for every systemically less important bank.

4.1 Calculation based on the return on risk-weighted assets

BCBS (2011b) uses two methods to determine the SIB buffer according to the expected impact principle. The first method uses a Merton model to estimate a bank's market-perceived probability of failure from the market prices of its equity (see, for example, Seidler, 2008). The second method is based on the historical frequency distribution of the return on risk-weighted assets (RORWA – see Kuritzkes and Schuermann, 2010). As the shares of only one Czech bank are traded on public markets, the Merton model has limited application in the Czech banking sector. For this reason, the RORWA method is used in this study.

The expected impact principle can be expressed formally as follows: for all $sib \geq sib^R$, $P(sib)$ should satisfy

$$P(sib)C(sib) = P(sib^R)C(sib^R),$$
$$P(sib) = P(sib^R)/[C(sib)/C(sib^R)]. \quad (1)$$

In order to derive the values of $P(sib)$ and subsequently also the capital buffer $k(sib)$ based on the bank's *sib*, we first need to determine the value of $P(sib^R)$. The first step is to choose the level of sib^R itself. While the *sib* for each bank is given by the empirically observed levels of the various indicators for that bank, sib^R has to be determined on the basis of regulatory considerations. Setting sib^R equal to q times the average *sib* for the entire Czech banking sector (where it makes sense only to consider values of $q > 1$) would seem to be an acceptable and transparent method and is the one we will keep to in this article. The value of q is chosen at the discretion of the regulator depending on how strict it wants the D-SIB buffer regime to be: the lower q is, the higher the buffers will be; moreover, reducing q may expand the set of banks to which the buffers will apply. For the following calculations we choose $q = 2$.

Assumptions (i)–(iii) listed above and the assumption $k(sib^R) = 0$ imply that $P(sib^R)$ corresponds to the probability that the bank will make a negative profit of

$$-[k_{basic} + k(sib)] = -(2.5 + 0) = -2.5\% \text{ of } RWA$$

or lower. With the historical RORWA distribution, this is therefore the relative frequency of cases where $RORWA \leq -2.5\%$. If we simultaneously interpret the historical RORWA distribution as being the RORWA probability distribution in the future, then

$$P(sib^R) = p(RORWA \leq -2.5\%).$$

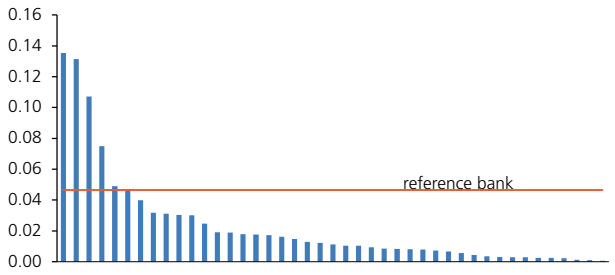
To calculate $P(sib)$ from equation (1) we now need to determine the value of $C(sib)/C(sib^R)$. In accordance with intuition and with a proposal contained in BCBS (2011b), we can assume for simplicity that this ratio can be approximated as sib/sib^R. Using the historical RORWA distribution we can then derive the minimum capital loss for each level of $P(sib)$.

The capital requirement $k_{basic} + k(sib) = 2.5 + k(sib)$ should be of an amount covering this loss. This gives us the D-SIB capital buffer $k(sib)$ based on the degree of systemic importance of the bank.

5 Besides the expected impact approach, BCBS (2011b) uses the results of other approaches (models created by the Macroeconomic Assessment Group and a method based on the implicit subsidies that some highly systemically important banks receive because the market considers them to be too big to fail, i.e. it expects public money to be spent on bailing them out if they get into difficulty). These approaches, however, are difficult to apply to the Czech banking sector.

CHART 1

D-SIB SCORES OF INDIVIDUAL BANKS IN THE CZECH REPUBLIC
(x-axis: ranking of banks by D-SIB score; y-axis: D-SIB score)



Source: Authors' calculations
Note: The "reference bank" line indicates a D-SIB score of double the sector average.

TABLE 2

VALUES OF KEY PARAMETERS

Excluding first:	Parameter	
0 quarters	$P(sib^R)$	0.016
	P(sib) for highest *sib*	0.005
	Exact D-SIB buffer for highest *sib* (% of RWA)	5.48
4 quarters	$P(sib^R)$	0.006
	P(sib) for highest *sib*	0.002
	Exact D-SIB buffer for highest *sib* (% of RWA)	3.87

Source: CNB, authors' calculations

5. RESULTS

We include all banks active in the Czech Republic since the start of 2002 (including building societies and branches of foreign banks) in the sample of banks for which we are determining D-SIB scores and D-SIB buffers. The sample therefore contains both "original banks" which entered the Czech market before 2002 and "new banks" which entered this market after 2002 Q1.

We chose 2002 as the start of the data sample. For pre-2002 data there is a risk that the figures are too distorted by the previous privatisation of banks, the related clean-up of their balance sheets and similar transformation processes, which cannot be considered standard bank finance factors. On the other hand, 2002 saw the last two cases of traditional banks having their licences revoked (Union Banka and Plzeňská banka), so the data sample will not be distorted by not containing any cases of adverse changes in banks' finances.

To determine the D-SIB buffer, we use the quarterly RORWA time series for each bank, calculated as the bank's after-tax profit divided by the value of its risk-weighted exposures.

The resulting D-SIB scores of the individual (anonymised) banks for the relevant indicator values at the end of 2011 are shown in Chart 1. The horizontal line in the chart indicates the D-SIB score of the hypothetical reference bank (i.e. sib^R), which we need to determine in order to be able to set the D-SIB buffer. The set of banks for which $sib > sib^R$, and therefore to which a non-zero D-SIB buffer should apply, has six members.

Table 2 summarises the resulting value of $P(sib^R)$, i.e. $P(sib)$ for the reference bank, and subsequently $P(sib)$ and the corresponding D-SIB buffer [i.e. $k(sib)$] for the bank that had the highest D-SIB score in the Czech banking sector according to the end-2011 data.

The calculation must take into account the fact that the finances of new banks can initially be significantly distorted by specific start-up costs. In this article, therefore, the calculations ignoring the first four quarters after banks enter the market are regarded as the baseline. The D-SIB buffer for the bank with the highest D-SIB score should be 3.87% of risk-weighted assets. In regulatory practice, however, it is more appropriate to categorise banks into "classes" by rounding up their exactly calculated D-SIB buffers to the nearest half per cent, for example. An exact D-SIB buffer of 3.87% will thus be rounded to 4.0%.

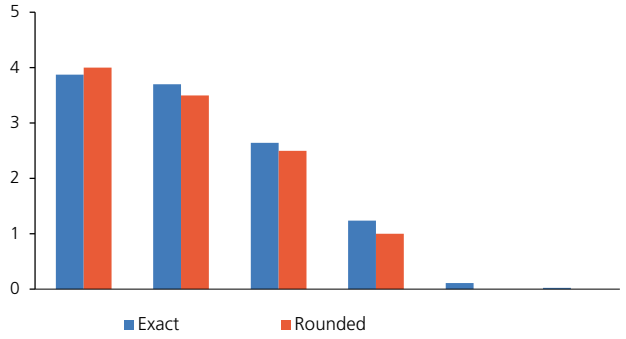
Chart 2 shows the exact and rounded results of the D-SIB buffer calculation for all banks in the Czech Republic whose D-SIB scores are higher than sib^R and whose D-SIB buffers are therefore above zero. Each pair of columns in this chart corresponds to a single bank and illustrates its exact capital buffer and its buffer rounded to the nearest half per cent. Banks are ranked in descending order of D-SIB score (and thus also exact D-SIB buffer).

As mentioned above, $q = 2$ implies that the D-SIB buffer regime should apply to six banks. However, it is clear from Chart 2 that due to rounding the resulting D-SIB buffer of banks five and six is zero (even though their D-SIB scores slightly exceed that of the reference bank).

The given specific D-SIB scores and also the D-SIB buffers are based on the parameters of individual banks and the banking sector as a whole as of the end of 2011 and on the financial results of all banks since the start of 2002. In the future, therefore, they may change depending on how the parameters of individual banks and the whole banking sector change and on how the banks' financial results develop.

CHART 2

D-SIB BUFFERS OF INDIVIDUAL BANKS IN THE CZECH REPUBLIC
(x-axis: ranking of banks by D-SIB score; y-axis: D-SIB buffer in % of risk-weighted assets)



Source: Authors' calculations

Buffer rounding is a stabilising factor in the sense that it reduces the frequency of change in the D-SIB buffer level. The resilience of buffers to excessive volatility can be further enhanced by calculating D-SIB scores not from the values of source indicators as of a single date, but from longer-term averages. On the other hand, the stability of D-SIB buffers must not excessively limit their "motivational" effect: it must not lead to a situation where a bank's efforts to reduce its D-SIB buffer by reducing its systemic importance take too long to bear fruit.

6. CALCULATING CAPITAL BUFFERS USING STRESS TESTS

As stated in BCBS (2010), stress tests, which are used to assess the resilience of the banking sector to adverse shocks, can alternatively be used to calculate capital buffers. Stress tests indicate how sensitive banks are to particular risks and how the materialisation of such risks will affect their capital adequacy ratios. From this perspective, therefore, it is possible to use stress tests to identify the amount of capital that individual banks should maintain above the currently set minimum limit to ensure that their capital does not fall below the critical level k_{min} even if an adverse scenario materialises. Consequently, stress tests can serve to some extent as an ancillary method for determining D-SIB buffers. One should bear in mind, however, that stress tests capture the impact of risks to banks' capital adequacy which pertain solely to a particular predefined stress scenario. If a different scenario were chosen, the stress tests might lead to different results and thus also to a different amount of missing capital. This constraint should be borne in mind when calculating capital buffers using stress tests.

For the purposes of this article, we use the *Protracted Depression* stress scenario described in more detail in the main text of this Financial Stability Report. The scenario is reflected in a sustained recession and substantial banking sector loan losses in the domestic economy.

On the basis of the stress scenario, we can thus identify for each bank the capital losses generated by adverse developments coupled with risk materialisation and hence how much additional capital the bank would have to hold (if it entered the tests with only the minimum capital level of 7% of CT1) in order not to fall below the limit of 4.5% of CT1. For most banks included in the test, the capital buffers based on stress tests are roughly comparable with those presented in the previous section of this article; minor differences may arise for individual banks because some banks are more sensitive to the risks associated with the chosen stress scenario than other banks, which, conversely, might be more vulnerable to risks not envisaged in the stress scenario.

7. SYSTEMIC IMPORTANCE VERSUS TOO BIG TO FAIL STATUS

Another question linked to the systemic importance and D-SIB score of a bank is whether a bank whose systemic importance exceeds a certain threshold is automatically considered so important that it will be bailed out from the public purse if it gets into difficulty. Such banks are referred to as too big to fail (TBTF). This can lead to moral hazard, with banks that enjoy such status relying on state intervention and taking excessive business risks.

On the face of it, the result of the D-SIB buffer calculation can be regarded as a distribution of all banks into those with a zero D-SIB buffer (a D-SIB score lower than the reference bank's) and those with a positive buffer which rises as a function of the bank's D-SIB score. This binary distribution of banks into "banks without a buffer" and "banks with a buffer" may be interpreted by the markets as a signal that removes the uncertainty about public bail-outs in the following sense: "If a non-zero D-SIB buffer is imposed on a bank, the bank is so important that the state will want to rescue it, i.e. it enjoys absolute too big to fail status; by contrast, a bank with a zero D-SIB buffer is relatively unimportant and will thus not be rescued".

Many texts on the determination of D-SIB buffers indirectly support this not necessarily correct inference. For example, Brämer and Gischer (2011) state that the BCBS methodology for determining the systemic importance of

banks is focused on identifying TBTF banks (and on suitably tightening the regulation of such banks). Banks with a non-zero D-SIB buffer and banks with too big to fail status are often treated as two identical groups in the media as well.

If we accept this thinking, however, the D-SIB buffer regime may ultimately be counter-productive: it may exacerbate the problem of moral hazard linked with too big to fail status. So if a regulator is of the view that the D-SIB scores it has calculated and the D-SIB buffers it has set do not in themselves preordain a public bank bail-out, it should emphasise this fact in its external communications on D-SIB buffers. At the same time, it is clearly also necessary to suppress too big to fail status directly by putting in place mechanisms (legislation and possibly also resolution plans) that will allow it to resolve the problems of any bank, where possible with limited impacts on the economy and without significant public spending. The reforms currently going on at national and international level are aimed squarely at bolstering such mechanisms.

8. CONCLUSION

This article proposed a comprehensive approach to calculating the systemic importance of banks in the domestic banking sector (the "D-SIB score") and went on to describe one way of determining the additional capital requirement ("D-SIB surcharge") of a bank on the basis of its systemic importance score. The proposed approach respects the core principles set out in BCBS publications while reflecting the conditions of the Czech banking sector.

We used the proposed approach to calculate specific systemic importance scores for individual Czech banks based on end-2011 data. We then derived additional capital requirements based on the systemic importance of individual banks using historical time series for the past 10 years on the return on risk-weighted assets of banks. The calculation showed that this additional capital requirement should be non-zero for a total of four banks after rounding. The highest rounded requirement was CT1 capital of 4.0% of risk-weighted assets.

However, the presented calculations should be regarded only as an analytical basis for further debate. When deciding on which banks to apply a D-SIB buffer to, and how large the buffer should be, the CNB may take into account indicators and approaches other than those proposed in this article.

Lastly, the article tries to emphasise the difference between the set of banks with a non-zero D-SIB buffer and banks with too big to fail status. A non-zero D-SIB buffer does not necessarily mean that the state intends to bail out the bank concerned if it is in danger of failing, however widespread this simplified view may be in the media and some financial publications.

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FISCAL SUSTAINABILITY AND FINANCIAL STABILITY

Zlatuše Komárková, Vilma Dingová and Luboš Komárek

As the two-way interaction between the financial sector and the government sector grows, so does the dependence between financial stability and fiscal stability. The high creditworthiness of government debt represents both a significant source of certainty for the financial system and a solid basis for the pricing of assets through the supply of "risk-free" government bonds. Given the risk of a downward spiral developing between the two sectors, it is vital, in the interests of financial stability, to monitor fiscal stability in order to put a timely regulatory "block" on excessive interaction. This article illustrates that when assessing sovereign risk in the balance sheets of domestic financial institutions, one needs to consider the dependence of debt sustainability not only on the size of the debt in relation to GDP, but also on the macroeconomic conditions affecting interest rates and economic growth. The article then discusses current and newly proposed prudential policy tools suitable for reducing sovereign risk in financial institutions' balance sheets.

1. INTRODUCTION

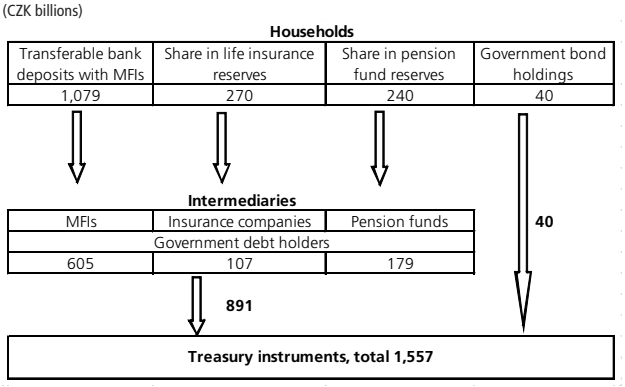
Government bonds are generally regarded as risk-free (i.e. highly liquid, high-quality) assets, thanks mainly to the high credibility of the state as issuer and the high quantity of debt issued. As a debt issuer empowered to collect taxes, the state is in a unique position. Its finances are seen in an intertemporal context, because as a debtor it can carry its debt forward from one period to the next. Such intertemporal debt servicing allows government bonds to be used as store of value, which in turn motivates economic agents to hold them.[1] Despite this unique ability of the government, government bonds has risk-free status only if creditors are convinced that the debt will be repaid, i.e. if they believe it is sustainable. However, the relationship between the creditors of government debt and fiscal policy, which affects the debt, can be very fragile, and with growing debt this relationship can quite quickly become unstable.

The current fiscal stance of many advanced countries is considered unsustainable in the long term. As a result, questions are being asked about how risk-free government bonds really are. An unsustainable fiscal stance does not mean that the government's debt is unsustainable (Cottarelli, 2012). If creditors are confident in the sustainability of the debt and continue to demand government bonds, fiscal adjustment can take place "simply" by pursuing a policy of primary surpluses (referred to as the "orthodox approach"). If, however, creditors lose confidence in the sustainability of government debt, an unorthodox approach to fiscal adjustment may become inevitable. In such case, the debt burden is transferred from the debtor to the creditor in the form of financial repression, debt restructuring or monetisation. The unorthodox approach usually implies very high costs, often greatly exceeding those of orthodox adjustment (for example loss of independence of authorities or the sacrificing of other policy targets). It can also necessitate the adjustment of other policies, such as the regulatory framework for the financial system or central bank collateral policy. Fiscal adjustment should thus take place in a timely manner.

The Czech Republic is a country whose government debt is currently considered sustainable. The Czech government bond market currently enjoys a high level of trust. Demand in the primary market is satisfactory and yields are very low (see Section 3, Chart III.2). Around 80% of Czech

FIGURE 1

THE HOUSEHOLD SECTOR AS A STATE BUDGET FUNDING SOURCE
(CZK billions)

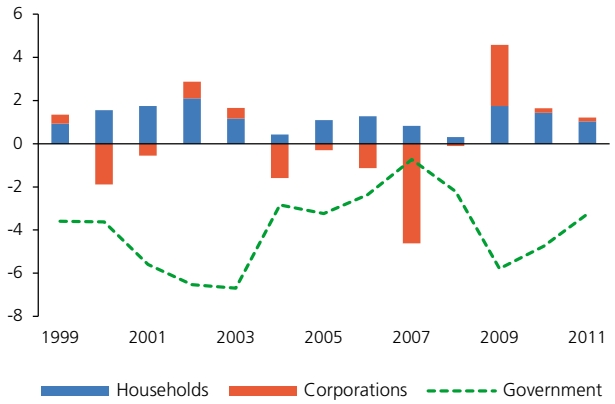


Source: CNB, MF CR
Note: Data as of 30 June 2012. This is the "maximum variant", where all government paper held by financial intermediaries is purchased with households' funds. MFI is monetary financial institutions.

1 Governments can print money to pay off their debts. Their ability to do so depends mainly on the degree of central bank independence and on their ability to change it. However, Article 123 of the Treaty on the functioning of the European Union forbids central banks of EU Member States and the ECB from purchasing debt securities directly from EU institutions, bodies, offices or agencies, central governments, regional and local or other public authorities, other bodies governed by public law, or public undertakings of Member States.

CHART 1

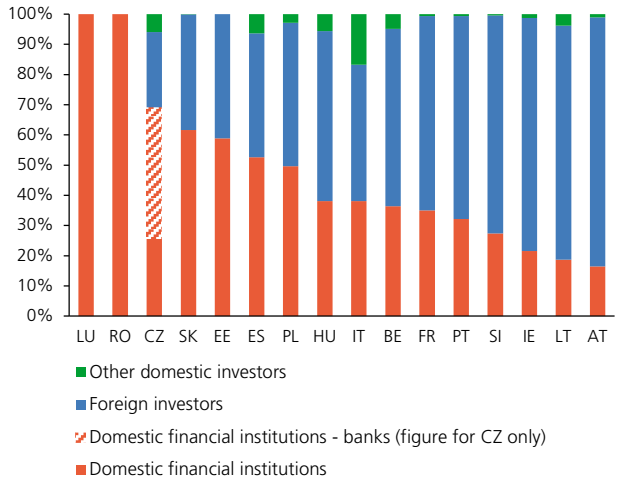
FINANCIAL SURPLUSES BY SECTOR
(% of GDP per capita, x-axis: years)



Source: CZSO
Note: GDP at PPP; general government comprises all government institutions (state organisational units, territorial governments, selected subsidised organisations, state and other extra-budgetary funds, the Railway Infrastructure Administration, transformation institutions, public universities and health insurance companies).

CHART 2

GOVERNMENT BONDS HOLDINGS BY TYPE OF INVESTOR
(%, 2011, figure for CZ for 2011 4Q)



Source: Eurostat, CNB

government debt is issued in the domestic currency and around 70% of it is held by residents. The bulk of it is financed indirectly by domestic households, whose financial surpluses are relatively high at present (see Chart 1). Czech households have directly bought a negligible amount of the total debt issued,[2] but indirectly are estimated to account for up to 60% of total funding through financial intermediaries (see Figure 1).[3] This gives rise to a two-way interaction between financial intermediaries and the sovereign sector. In the Czech Republic, given the relatively high proportion of government bonds in financial institutions' balance sheets, this interaction can be identified as systemically important (Chart 2).

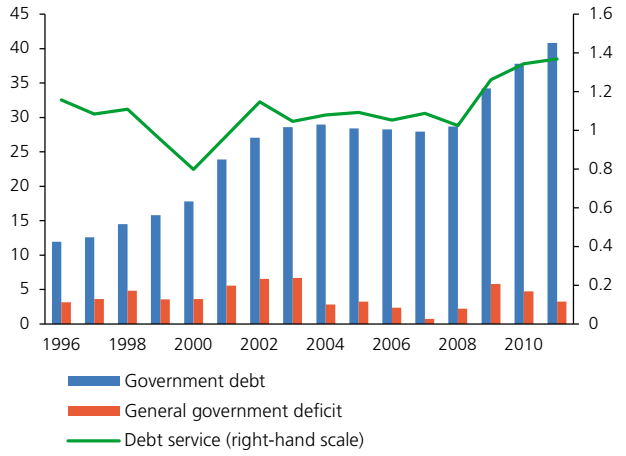
The long-term Czech public finance trend can be seen as potentially risky (see Chart 3). As in other developed countries, the population of the Czech Republic is ageing. In the long term we can thus assume, on the one hand, gradually rising government spending due to higher health care costs and higher pension payments and, on the other hand, falling government debt financing capacity due to lower aggregate household savings. Moreover, as the crisis fades and the economy starts growing again, investors can be expected to return to riskier assets than government bonds. These factors indicate that the favourable environment for higher debt dynamics is only temporary and suggest a medium-term need to stabilise public debt before its absolute size significantly exceeds the domestic sector's financial capacity and it becomes necessary to issue debt to a greater extent in foreign currency and place it with non-residents (see Section 3, Chart III.15). The sovereign sector may get into a situation where it cannot pay its debts. The probability of this situation arising is higher if the government debt is denominated in foreign currency (Rosenberg, Ch. et al, 2005).

From the CNB's perspective, it is therefore vital to safeguard financial stability by constantly monitoring and assessing the risks arising from the interaction between the financial sector and the sovereign sector and to help mitigate those risks through prudential action. The aim of this article is to assess sovereign risk in the context of public finance sustainability and to discuss a potential regulatory framework that might be suitable for reducing that risk.[4] The article starts by presenting sovereign risk from the perspective of its systemic importance and in the context of the current and newly discussed financial regulation. It then analyses government debt sustainability in the Czech Republic on the basis of various scenarios. The final part of the article presents prudential policy tools that could be used to mitigate sovereign risk and put a notional regulatory "block" on excessive interaction between the financial sector and the government sector.

2 Government saving bonds were made available to private individuals and non-profit organisations in 2011.
3 For example, Japanese households directly or indirectly finance around 50% of government debt (Tokuoka, 2010, p. 16).
4 In this article, sovereign risk means the risk of government debt default or restructuring, i.e. it does not relate to short-term volatility in government bond prices (yields) manifesting itself in a change in the market or liquidity risk of this asset. Sections 3 and 4 of this Report discuss the formation and materialisation of these two risks.

CHART 3

PUBLIC FINANCES IN THE CZECH REPUBLIC
(% of GDP)



Source: CZSO, authors' calculations

2. SOVEREIGN EXPOSURES AS A SYSTEMIC RISK

Financial stability depends critically on the two-way interaction between the financial sector and the sovereign sector (Caruana and Avdjiev, 2012). Sovereign creditworthiness represents the ultimate source of insurance for the financial sector (through the provision of direct financial injections) and provides a basis for the pricing of other assets through the supply of risk-free government bonds, while the financial sector ensures the smooth flow of credit to the real economy as well as financing for the sovereign sector.

The current and newly prepared European banking regulation treats sovereign risk by essentially not admitting the possibility of the domestic government defaulting on its debt, and the credit risk associated with government bonds is considered to be zero up to a certain threshold. Comparing to other counterparties, the regulation gives preferential treatment to sovereign exposures and, simply put, considers the sovereign sector to be permanently stable. This is evident from the following features of the regulation (BCBS, 2010, 2011; Nouy, 2012): (i) a low or zero capital requirement for sovereign exposures denominated in the domestic currency, (ii) a low capital requirement for exposures collateralised by government paper given the very low haircuts required for sovereigns with high ratings, and (iii) the exclusion of sovereign exposures from the existing limits on large exposures. These rules are also included in the new regulatory framework currently under preparation, which, in its new liquidity standards, additionally automatically proposes to classify government bonds denominated in the domestic currency as highly liquid, high-quality assets. Moreover, the new Solvency II framework for the insurance sector envisages a zero risk factor for sovereign exposures. The primary objective of regulation generally is to make financial institutions safer and sounder by motivating the financial system to avoid taking excessive risks and to set aside sufficient reserves to absorb losses. The sovereign exposure rules neglect this general regulatory objective. The result is that they directly motivate financial institutions to accumulate sovereign debt in their balance sheets. This strengthens the two-way interaction between the financial sector and the sovereign sector.

The current debt crisis has cast a spotlight on the negative manifestations of the two-way interaction between the financial sector and sovereign sector in the euro area and the wider world. Risks are spreading from the financial sector to the sovereign sector through two main channels: (i) the provision of government support to the financial sector (direct capital increases, government guarantees, etc.), which is increasing sovereign debt, and (ii) financial sector deleveraging, which, by amplifying the contraction in overall economic activity, is leading to falling budget revenues and rising budget expenditures. The main channels through which the growth in sovereign risk is spreading to the financial sector are (i) change in the level of risk of other assets denominated in the same currency as sovereign exposures,[5] and (ii) government bond revaluation losses (Janáček et al., 2012). If sovereign risk is very high and manifests itself as a large capital loss or a fall in market confidence in the sovereign's ability to provide implicit and explicit guarantees, it can cause financial institutions' funding costs to go up, limit their access to domestic or foreign credit markets and/or lead them to defaulting. The above channels can operate independently or simultaneously. They can be mutually reinforcing and set in motion a downward spiral of loss generation and cost growth in both sectors, with major systemic implications and negative effects on the real economy. To maintain financial stability, it is vital that both these sectors are stable (Caruana and Avdjiev, 2012). It is not enough to create traditional capital and liquidity buffers within the financial sector. It is also necessary to achieve a sustainable sovereign debt level.

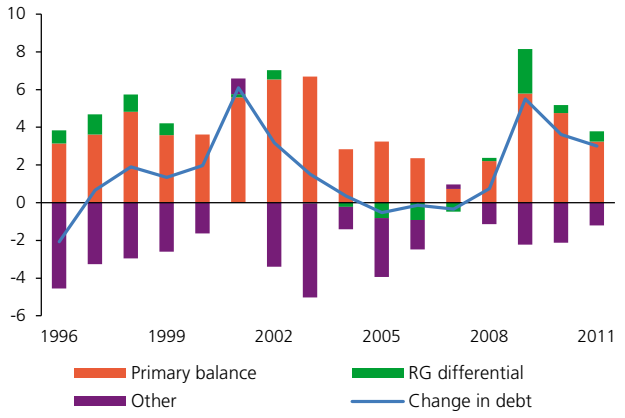
5 Sovereign risk acts as the lower threshold for determining the level of risk of other assets denominated in a given currency.

3. SOVEREIGN DEBT SUSTAINABILITY

The size and nature of the sovereign sector make it systemic important. The government sector is generally regarded as solvent if the discounted present value of future public budget revenues and expenditures is equal to or lower than the discounted value of its present debt. However, the solvency of the sovereign sector depends to a large extent on creditor confidence in the sustainability of its debt. Doubts about debt sustainability can be self-fulfilling, as they bring higher risk premia which, in turn, require larger primary surpluses and greatly complicate the government's task of achieving fiscal equilibrium (Noyer, 2012). Confidence in debt sustainability is affected by many factors, including absorption capacity and type of creditor base, debt maturity, currency of issue, and capital market size and maturity. However, fundamental factors, i.e. the expected budget revenues and expenditures, interest rates and economic growth, are dominant.

CHART 4

CZECH GOVERNMENT DEBT DYNAMICS
(% of GDP)



Source: CZSO, authors' calculations
Note: "Other" consists mainly of stock-flow adjustment items, which reflect the difference between the debt (financial accounts) and the deficit (non-financial accounts), e.g. growth in debt due to exchange rate depreciation or revaluation of state ownership interests.

3.1 Public finance sustainability – the traditional approach

Sovereign solvency is traditionally assessed by analysing public finance sustainability (for more details see Izák, 2008) from a purely accounting perspective by comparing government revenues (T) and expenditures (E) (excluding interest costs), while taking into account the absolute size of the debt (B) and the debt servicing costs, i.e. the effective interest rate (r):

$$B_t = (1 + r_t)B_{t-1} - (T_t - E_t) \qquad (1)$$

The interaction of the absolute debt level with the performance of the economy is best analysed in relative terms, e.g. in relation to GDP:

$$\underbrace{\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}}}_{Change\ in\ debt} = \underbrace{\underbrace{(r_t - g_t)}_{RG\ differential}\left(\frac{B_{t-1}}{Y_{t-1}}\right)}_{Debt\ servising\ costs} - \underbrace{\frac{(T_t - E_t)}{Y_t}}_{Primary\ balance} \qquad (2)$$

It is clear from equation (2)[6] that the real debt level and the change therein (the "debt dynamics") depend on the initial debt level, the real interest rate (r), real output growth (g) and fiscal policy as reflected in the resulting primary balance ($PB_t=(T_t-E_t)/Y_t$). The primary balance (net of debt servicing costs) expresses whether the government budget was prepared with a surplus (PB>0) or a deficit (PB<0). The key factor for the debt dynamics is the RG differential (RG=r-g).[7] Assuming a balanced budget (PB=0), if (r) is lower than (g) in the long term the debt converges to a sustainable level. This situation is referred to as stable debt dynamics. By contrast, if (r) is higher than (g) in the long term, the debt level diverges from the sustainable level. In extreme cases, if the RG differential stays positive for an extended period, or suddenly rises, the debt dynamics can explode. The key fiscal policy adjustment variable is the primary balance.[8] For debt stabilisation, the primary surplus must equal the debt service interest costs. If a primary deficit is recorded, the debt is sustainable only if (r-g)>PB. However, equation (2) cannot be interpreted as an optimal fiscal rule, as it is procyclical by construction and such procyclicality is inconsistent with the traditional objective of fiscal policy. If the debt is already at the limit of sustainability and the government wants to reduce it by pursuing fiscal consolidation, a negative RG differential implies a need to draw up a balanced budget. When the economy worsens and the RG differential turns positive again, the government's stabilisation efforts will build on the new lower level of debt.

Using this simple approach, we focused on analysing Czech public finances in the period 1996–2011 (see Chart 3).

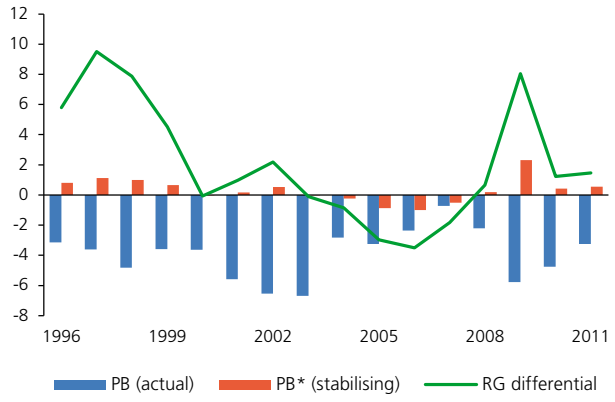
6 The equation can be decomposed into parts reflecting domestic currency debt and foreign currency debt. Given the current dominance of domestic debt in the domestic currency we do not work with this dimension in the following text.

7 The unapproximated RG differential takes the form (1+r)/(1-g); when (r) and (g) are low, the differences compared to the simplified version are negligible.

8 Canada, which reduced its debt from 74% of GDP in 1995 to 34% in 2007, can be regarded as a successful case of fiscal consolidation.

CHART 5

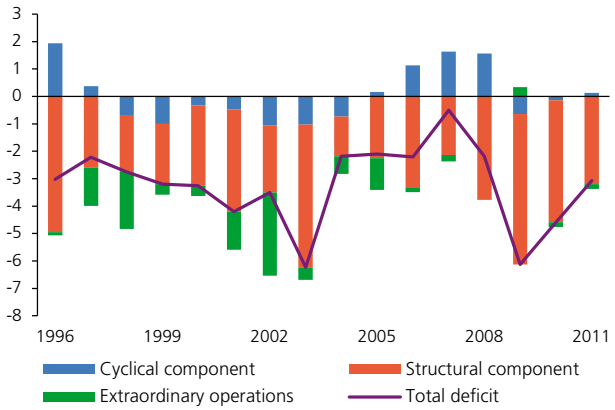
FISCAL SUSTAINABILITY OF THE CZECH REPUBLIC
(% of GDP)



Source: Eurostat, CNB
Note: PB* is the primary balance that would lead to stabilization of the debt at the given interest costs and economic growth rate.

CHART 6

GOVERNMENT DEFICIT DECOMPOSITION
(% of GDP)



Source: CZSO, authors' calculations
Note: The cyclical and structural balances are calculated using the European Commission method. "Extraordinary operations" consists of random one-off measures, e.g. leasing of military aviation engineering.

The debt dynamics here are unsustainable in the long term, as the debt rises from 14% of GDP in 1996 to almost 41% in 2011 and continues to go up thereafter. The debt dynamics and the contributions of the individual components, i.e. the primary balance and the RG differential, are presented in Chart 4.[9] It shows that the primary balance contributed to increasing Czech government debt throughout the period. In 2004–2007, meanwhile, real economic growth was substantially higher than the real effective interest rate and the RG differential was thus negative. The primary balance that would have led to stabilisation of government debt in the period under review (PB*) was very different from the actual primary balance in the Czech Republic for almost the entire period (see Chart 5). The dominance of the structural component of the government deficit (see Chart 6) reflects the fact that fiscal policy is being set procyclically on the basis of a perceived low debt level and persisting favourable market conditions. However, the gradually rising debt burden is increasingly limiting the room for countercyclical fiscal policy in the future.

To illustrate the potential long-term government debt trajectories, we prepared variant scenarios (see Chart 7) based on different assumptions about long-term economic growth (g), the effective real interest rate (r) and the government's consolidation efforts (PB). The initial state corresponds to the current debt level in the Czech Republic. The scenarios broadly indicate that (i) fiscal efforts to keep the deficit at 3% of GDP lead in all variants to rapid growth in government debt, even given relatively optimistic assumptions about the Czech economy and the interest rate level; (ii) even an ambitious fiscal consolidation (a zero primary balance in the long term) will fail to deliver fiscal sustainability if the economy does not grow fast enough and/or if real debt servicing costs rise (r>g).

3.2 Public finance sustainability – a more sophisticated approach

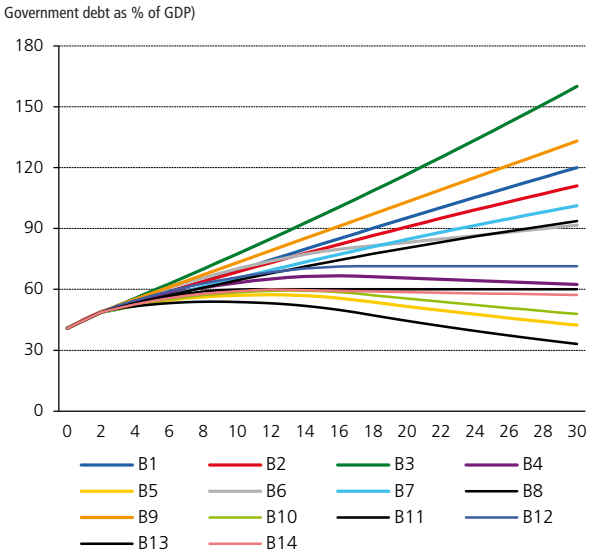
Traditional public finance sustainability analysis yields relatively quick, clear and simple information about the direction in which public finances are headed. Its first drawback is that if it is forward-looking its conclusions are relevant only insofar as the assumptions about the future evolution of the key parameters (r), (g) and fiscal policy are correct. A more sophisticated analysis is based on actually estimating or calibrating the factors that affect (r) and (g) and also on the reaction function capturing the effect of the macroeconomic conditions on the fiscal policy settings. The second drawback is the fact that besides comparing actual public budget revenues and expenditures in accounting terms, comprehensive analyses should also consider contingent liabilities (e.g. the guarantee mechanism) and implicit liabilities (e.g. projected expenditure reflecting demographic trends).

Sovereign risk assessments should consider debt dynamics in the context of the RG differential. Changes in (r) and (g) can change the debt quite quickly from sustainable to

9 In addition to these components, the change in government debt is affected by stock-flow adjustment (SFA) items. However, we exclude these from our analysis (for more details on SFA, see Box 1 in Inflation Report IV/2010.

CHART 7

NOMINAL DEBT PATHS GIVEN DIFFERENT ASSUMPTIONS ABOUT ECONOMIC GROWTH, INTEREST RATES AND THE PRIMARY BALANCE



(%)

Debt trajectory	GDP growth (g)	Real interest rate (r)	Primary balance (PB)
B1	**2**	1.5	deficit 3 % GDP
B2	**2**	1	deficit 3 % GDP
B3	**2**	3	deficit 3 % GDP
B4	**2**	1.5	consolidation (after 17 years PB=0)
B5	**2**	1	consolidation (after 17 years PB=0)
B6	**2**	3	consolidation (after 17 years PB=0)
B7	**3**	1.5	deficit 3 % GDP
B8	**3**	1	deficit 3 % GDP
B9	**3**	3	deficit 3 % GDP
B10	**3**	1.5	consolidation (after 17 years PB=0)
B11	**3**	1	consolidation (after 17 years PB=0)
B12	**3**	3	consolidation (after 17 years PB=0)
B13	**2**	2	consolidation (after 17 years PB=0)
B14	**2.5**	0.5	consolidation (after 11 years PB=-1%)

Source: CNB, authors' calculations
Note: The calculations exclude implicit expenditure associated with population ageing and the income account deficit. Grey-shaded variants are consistent with public finance sustainability.

unsustainable, causing sovereign risk to materialise. The RG differential can change as a result of economic developments, including sudden shocks (e.g. a sudden rise in risk aversion increasing interest rates, or a global downturn reducing economic growth) and also as a result of fiscal policy itself. Endogeneity of the variables affecting debt dynamics arises from the fact that high debt has a feedback effect on both long-term interest rates and economic growth. The effect of high deficits on long-term rates is usually explained in the context of the neoclassical theory of saving. A government deficit reduces the saving rate and increases aggregate demand. As a result of a higher supply of government bonds, this exerts upward pressure on interest rates. In a situation where high public debt is accompanied by weak economic growth, interest rates are also driven up by a lack of market confidence in future debt repayment. This is reflected in a higher government bond credit premium. With regard to the effect of high debt on economic growth, economic theory predicts that in the long run, government consumption will crowd out private investment, leading to weaker economic performance.

In a more sophisticated analysis, we examined the relationship between the debt level and the primary balance that would stabilise/reduce the debt level.[10] Our quantification assumes an increase in the debt-to-GDP ratio of 1 percentage point per year from its current level, assuming a rise in the interest rate and a fall in economic growth. This is reflected in a constantly positive RG differential (r>g). The parameters for determining the level of the interest rate and economic growth were calibrated using the estimates of Baldacci and Kumar (2010) and Kumar and Woo (2010), who take into account both the existence of endogeneity and the non-linearity of the relationship. A 1 percentage point increase in debt was associated with an increase in the interest rate of 0.05 percentage points, and above a debt level of 50% of GDP a rise in debt of 10 percentage points was associated with a fall in economic growth of 0.2 percentage points. Stabilisation of the debt at 50% of GDP, which would require a budget with a primary surplus of 1.5% of GDP, is an achievable fiscal objective. The same goes for a debt of 60% of GDP. By contrast, estimated surpluses of primary balance at 3.2% of GDP, reducing the debt to 15% over 15 years (from its initial level of 50% of GDP), is apparently an unachievable fiscal objective and would additionally constrain economic growth.

10 Eller and Urvová (2012) offer a more advanced approach to public finance sustainability in the CEE region.

4. MACROPRUDENTIAL POLICY AND SOVEREIGN RISK

Given the already very high sovereign exposures in the Czech financial sector (Chart 2), it is crucial from the financial stability perspective to constantly assess the fiscal sustainability of Czech government debt and discuss any change in the regulatory approach to sovereign risk on either the domestic or foreign scene. There is no consensus among economists and supervisory authorities on how to regulate sovereign risk. Proponents of regulation argue that macroprudential tools should be used to mitigate sovereign risk in the financial system and assert that exempting sovereign exposures from regulation may imply a need to monetise them in the event of unsustainability regardless of the side-effects of such policy. A key factor in the debate about sovereign risk regulation, meanwhile, is the actual macroprudential policy goal that is being pursued by changing the regulatory framework. If the goal is solely to safeguard the soundness and stability of financial institutions, prudential policy will be directed at motivating financial institutions not to underestimate sovereign risk and to hold an optimum level of sovereign exposures.

There is scope for revising the current regulatory framework on several levels. The first possibility is to tighten the minimum capital requirements for credit risk stemming from sovereign exposures under Pillar 1. Banks can currently set prudential capital requirements to determine risk weights for sovereign risk by using external ratings through the standardised approach or by applying the Internal Ratings-Based (IRB) approach by using their own rating systems. Under the standardised approach, risk weights are set in two variants depending on the currency in which sovereign exposures are denominated. If they are denominated in a foreign currency, the risk weights range from 0% for sovereign exposures with the highest ratings (AAA to AA-) to 150% for exposures with the lowest rating (B-). Exposures for which no rating is available have a risk weight of 100%. In the case of sovereign exposures issued by the domestic government in the domestic currency, both Basel II (BCBS, 2006, Article 54) and the European CRD directive[11] allow national regulators to assign a zero risk weight. When using the IRB approach, banks internally estimate three parameters relating to sovereign risk: (i) probability of default (PD), (ii) exposure at default (EAD) and (iii) loss given default (LGD). The estimated parameters enter the calculations for determining the risk weights of the relevant exposures. With the aid of internal estimates, this approach allows for greater diversification between individual sovereign exposures. However, for sovereign exposures (unlike, for example, exposures to firms or financial institutions) PD is exempt from the minimum value of 0.03%. So, although the IRB approach does not automatically imply a zero risk weight for sovereign exposures with a high rating, it does allow one to be used. Moreover, even if banks have chosen the IRB approach, they can under certain conditions use it only partially and apply the standardised approach with a zero risk weight to some types of exposures, including sovereign exposures. The potential revision of this regulation consists in removing the exemptions for domestic currency-denominated sovereign exposures issued by the domestic government, setting minimum PD and LGD values as in the case of other counterparties, and tightening the conditions for the permanent partial application of individual approaches.

Another possible revision is being considered in the area of the large exposure of a financial institution to a single counterparty or economically linked group of clients. This regulation is focused on reducing concentration risk in banks' balance sheets by setting exposure limits of 25% of capital. However, EU Member States may currently fully or partially exempt assets constituting claims on central government or central banks which, unsecured, would be assigned a 0% risk weight (Article 113 of the CRD). The inclusion of risky sovereign exposures, including exposures denominated in the domestic currency, below a particular exposure limit, i.e. the abolition of the said exemption, could partially mitigate concentration risk vis-à-vis risky sovereign exposures.

Sovereign exposures are subject to interest rate risk. The regulations relating to this type of risk differ depending on whether government bonds are held in the trading or banking (or investment) portfolio. With respect to interest rate risk, Pillar 1 lays down minimum capital requirements only for sovereign exposures held in the trading portfolio.[12] One possibility, therefore, would be to require banks to hold additional capital to cover the interest rate risk of exposures held in the banking portfolio within the framework of active

11 Part 1 of Annex VI of Directive 2006/48/EC of the European Parliament and of the Council relating to the taking up and pursuit of the business of credit institutions: "Exposures to Member States' central governments and central banks denominated and funded in the domestic currency of that central government and central bank shall be assigned a risk weight of 0%".

12 Government bonds allocated to the trading portfolio are subject to two different capital requirements from the credit risk perspective: a capital requirement for general interest rate risk (linked with the general evolution of interest rates) and a capital requirement for specific interest rate risk (linked with the evolution of the interest rate demanded by the market from a specific debtor). Specific interest rate risk is thus to some extent analogous to the classic interest rate risk of a debt instrument in the investment portfolio. In the sovereign exposure context, therefore, a capital requirement is often created solely for general interest rate risk.

Pillar 2 banking supervision. If the government debt was to approach the limit at which doubts arise as to its sustainability, and the market and economic conditions for issuing and repaying such debt were to deteriorate gradually, the quality of sovereign exposures would start to be viewed as potentially compromised and the probability of sharp growth in interest rates would therefore increase. In such a situation, the national regulator should introduce prudential measures under Pillar 2 to adjust the real value of the sovereign exposure and increase the capital requirement. In such case, however, it is not just the interest rate risk that should be adequately capitalised. Sovereign exposures in the banking portfolio are usually large, so in the event of adverse fiscal developments, timely measures should also be taken to limit exposure to the sovereign counterparty. Account also needs to be taken of the fact that credit risk materialisation due to growth in sovereign risk will affect the financial institution's entire balance sheet, not just its sovereign exposure, because the value of government bonds, as mentioned above, provides a basis for the pricing of other assets.

There is also scope for debate about potentially risky sovereign exposures in the case of liquidity standards (the liquidity coverage ratio, LCR, and the net stable funding ratio, NSFR) contained in the newly proposed Basel III (BCBS, 2010 and 2011). Here, too, it is appropriate to take into account a prudential view in relation to sovereign risk. Assets with a standardised zero risk weight are classed as high quality liquid Level 1 assets in the case of the LCR and are assigned the lowest 5% required stable funding factor in the case of the NSFR. On the one hand, automatic classification of government bonds denominated in domestic currency among these assets regardless of their credit quality limits the potential adverse impacts of the liquidity standards at times of stress. But on the other hand, it may increase the incentive to hold government bonds in order to facilitate compliance with the liquidity requirements, and in particular it may foster overestimation of actual compliance with the standards if such bonds are not of high quality in reality. Furthermore, in the context of sovereign risk this new liquidity regulation might pose specific problems, especially in the case of European regulation. It requires reporting not only at market prices, but also the application of an adequate factor (not only 5%, but taking into account other risks at an amount at least equal to a market required haircut), which might during market tensions contribute to the volatility of the liquidity standards LCR and NSFR (the deterioration of sovereign debt quality will lead to a decline in market price and to an increase of the required stable funding factor). This can conversely increase market volatility.

Tightening sovereign risk regulation would have positive effects not only on the stability of financial institutions, but also in other areas. These positive effects also include, for example, suppression of the crowding-out effect that arises when the public sector is given preferential access to credit ahead of the private sector. The government might also be motivated to stabilise or reduce its debt owing a relative decline in domestic demand for the bonds it issues.

However, the impact of the stricter regulatory approach to sovereign exposures is critically dependent on the initial situation when it is implemented. The regulation will not necessarily have an unambiguously positive effect and could even lead to market or macroeconomic instability if significant sovereign risk has already accumulated in the balance sheets of banks and other financial institutions. Before introducing stricter regulation, one needs to analyse how the size and structure of the government's creditor base and overall market conditions will change if domestic financial intermediaries face constraints in buying more domestic government bonds or are even motivated to reduce the amount of such bonds in their balance sheets. Assuming inadequate consolidation of public finances and the application of stricter regulation, it is likely that domestic government debt would be offered to non-residents on the primary market at a higher yield. This would expose the government sector and indirectly the entire economy to substantial risks.[13] The holding of debt in foreign balance sheets opens the door to higher debt price volatility and therefore to growth in the market and liquidity risk of the debt. This generally leads to higher debt service costs, shorter average debt maturities and constant concerns about future debt refinancing. In other words, if stricter treatment of sovereign risk is introduced in an adverse initial situation when it is too late for preventive action, it may have destabilising effects. The main argument against regulating sovereign risk is that it is systemic, i.e. it cannot be diversified or isolated, especially if the sovereign debt in financial institutions' balance sheets is highly concentrated. Sovereign risk is regarded as systemic because materialisation of the risks (interest rate or credit) arising from sovereign exposures effects all financial institutions at once.

13 Global investors are more sensitive to uncertainty about the economy and are not very willing to distinguish in detail between economic conditions in different countries. They usually hold foreign assets in the trading portfolio, and their significant investment opportunities mean that the probability of future domestic debt refinancing is significantly lower.

We should also point out how difficult it is to estimate the capital requirement needed to absorb losses stemming from concentrated sovereign exposures (Nouy, 2012),[14] as sovereign risk is itself very difficult to evaluate given the dependence of government debt sustainability on market sentiment (Missale, 2013). Moreover, the impact of sudden sales of government bonds on the balance sheets of creditors and other intermediaries (especially institutional investors) when strict limits are applied to banks' exposures to the sovereign sector can destabilise the system.

These arguments imply that the macroprudential policy approach to sovereign risk should be defined more broadly than "just" to mitigate risks preventively and increase the loss-absorption capacity of financial institutions' balance sheets. At any given moment in time, the settings of the regulation of sovereign exposures should respect the existence of the two-way interaction between the financial sector and the government sector, i.e. the current level and structure of government debt. If this interaction is already systemically significant, i.e. the debt is already very high, prudential regulation should be introduced cautiously and gradually so that both sectors have time to adjust to the changes, thereby eliminating any serious negative side-effects of the stricter regulation on the real economy. On the other hand, prudential policy, and de facto also central bank collateral policy, should not deliberately motivate the financial sector to give the government preferential funding treatment at times when the above relationship is not yet systemic. Potentially appropriate measures for regulating sovereign risk in the Czech financial sector are suggested in Section 5 of this Report.

5. CONCLUSION

The high government debt levels in many advanced countries and the existence of a close and systemically significant relationship between the financial sector and the government sector have made sovereign risk an important economic topic. Although the current and newly discussed European regulation of financial sector assumes that sovereign exposures are risk-free and essentially ignores sovereign risk, adverse fiscal trends in many developed countries have cast doubt on the risk-free status of government bonds. In addition, negative manifestations of the two-way interaction between the financial sector and the sovereign sector, with their impacts on the real economy, have revealed the fragility of financial stability and its dependence on the stability of both these sectors. As the state is in a unique position as a debtor, its solvency and debt sustainability cannot be analysed solely in the context of the absolute debt level. Investor confidence should also be taken into account, as it reflects investors' expectations about the future development of the economy, which in turn affect the sovereign's ability to manage its accumulated debt. The current situation across countries demonstrates clearly how perceptions about the sustainability of government debt are relative to the absolute level of debt (see Section 3, Chart III.11).

This article illustrated that government debt can quite quickly change from sustainable to unsustainable, thereby causing sovereign risk to materialise. This rapid change is fostered primarily by a change in the confidence of creditors investing in government debt. The speed of this change depends on creditor type, debt maturity and the currency of issue of government debt. However, the fundamental sustainability factors are the quality and structure of budget revenues and expenditures, interest rates and economic growth. The government's efforts can thus be severely impeded by the current economic situation. This indicates a need to begin consolidating in a timely manner, as soon as debt unsustainability rears its head. A combination of high debt and weak economic growth can set in motion a downward spiral of loss and cost generation between the financial sector and the sovereign sector, leading to long-term debt unsustainability. In such case there will be pressure to implement unorthodox solutions in the form of redistribution of wealth between debtors and creditors. This, however, can limit the independence of the central bank and stop it achieving its targets (Leeper, 2013). In addition, according to the demographic outlook, population ageing will contribute significantly to a deterioration in public finances in the future. This will directly affect budget revenues and expenditures and thus further limit the scope for achieving the primary balances needed to safeguard debt sustainability.

Supervisory authorities thus still face the challenge of adopting a suitable prudential regulatory framework that will adequately reflect the accumulation of sovereign risk in financial institutions' balance sheets in a timely manner while not creating negative externalities for the real economy. The macroprudential policy objective vis-à-vis

14 The probability of default of a sovereign exposure is close to zero in the long term, i.e. the capital requirement for such an exposure will be very low in the long term. This probability is quite difficult to estimate, as experience tells us that government debt default can occur at various levels and under various conditions. A situation can therefore arise where, given a sufficiently large sovereign exposure, the capital requirement is de facto an ineffective tool for absorbing the loss given default, as the potential loss always exceeds the level of capital.

sovereign risk should be, on one level, to protect individual financial institutions against the materialisation of sovereign risk, but also, on a wider level, to prevent the excessive accumulation of sovereign risk in the system. The first level involves reducing the size of sovereign exposures and increasing the capacity of financial institutions' balance sheets to absorb losses arising from such exposures. The second level entails sending out a signal to governments about the need to stabilise public finances and coordinate economic policies. As shown by the experience of countries with high government debts (USA, EA, UK, JP), such coordination is vital for maintaining financial stability and achieving fiscal and monetary policy goals.

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HOUSEHOLD STRESS TESTS USING MICRODATA

Petr Hlaváč, Petr Jakubík and Kamil Galuščák

This article sets out to describe an expanded and refined framework for stress testing the household sector. In contrast to the original tests conducted by the Czech National Bank since 2011, the new framework incorporates modelling of transitions between employment and unemployment at the level of individual household members. Another advance is the incorporation of interest rates into the stress tests, with growth in rates affecting monthly loan instalments. As well as discussing the approaches to this issue used in other countries, the article presents empirical results from the expanded framework expressing the percentage of distressed households in each income group following the application of the macroeconomic scenarios considered.

1. INTRODUCTION

The financial crisis underscored the importance of monitoring and assessing the systemic risk of the household sector. Household distress in advanced economies and excessive credit growth in developing economies were major phenomena of the pre-crisis period. Overly relaxed credit standards before the crisis gave rise to sharp growth in credit risk during the crisis. This experience illustrates the importance of conducting microeconomic analyses of the household sector to capture the different impacts of a deterioration in the macroeconomic environment on different income groups of the population. For these reasons, the Czech National Bank (CNB) conducts stress tests of households to identify this risk and evaluate its potential impacts. In this way, the overall resilience of the household sector to adverse macroeconomic scenarios can be tested in the same way as in the case of the banking sector. The output of these tests is the percentage of households that are financially distressed. This result can then be used to estimate households' average probability of default, which serves as an input to bank stress tests.

The next section provides a review of related literature, focusing on approaches used in other countries. Section 3 then describes the CNB's stress test methodology for the Czech household sector. Section 4 presents the results obtained from the currently available data. The final section concludes.

2. STUDIES OF HOUSEHOLD FINANCIAL DISTRESS

There are many studies in the literature dealing with the identification of household financial distress and its macroeconomic implications. Some studies focus on the key determinants of the risk of insolvency or distress and the links between these risks and developments in the macroeconomic environment, while others examine the impacts of various macroeconomic scenarios on household consumption. In the past, insufficient attention was devoted to these issues owing to limited availability of statistics covering households' structured balance sheets and household consumption. The recent financial crisis has sparked interest in this issue among regulators and financial institutions that lend to households.

This article is based on stress testing of the household sector by central banks in the macroprudential context. Herrala and Kauko (2007) describe the model used by the Finnish central bank to forecast distress in the household sector. Distress is defined as a situation where the net income of households minus essential living costs and debt service payments is too low. The model inputs are the macroeconomic forecast and a micro data set of households. The authors simulate the impacts of shocks to unemployment, interest rates and housing prices on the level of distress. Shocks to interest rates have a larger impact than changes in unemployment and housing prices, because most household loans bear variable interest rates.[1]

Johansson and Persson (2006) simulate the risks of default by Swedish households in the event of a rise in unemployment, a rise in interest rates and a fall in asset prices. Distress is associated with a negative financial margin, defined as the household's income net of debt service costs and essential living costs. The calculation of the potential losses of the banking sector assumes that a negative margin is covered by households up to the value of their assets. The authors conclude that a 1 pp rise in interest rates would have practically no impact on the credit risk of the banking sector, and that even a 3 pp

1 The model is used to simulate the impacts of one-standard-deviation shocks added to a basic scenario. The standard deviations of the variables are calculated for the period 1986–2005. The authors admit that the impact of the interest rate shock is larger because rates were higher and more volatile in the run-up to Finland's accession to the EMU in 1999.

increase in rates would not cause the Swedish banking sector any significant problems in the form of credit losses.[2] The effects of rising unemployment are simulated using a Monte Carlo approach assuming that employed persons have an equal probability of becoming unemployed and that loss of employment means a fall in the income and margin of the household. It is apparent from the results that rising unemployment entails a lower risk of default than rising interest rates. The Danish central bank published a similar household stress test methodology in its financial stability report (Danmarks Nationalbank, 2007).

Albacete and Fessler (2010) describe the household stress test methodology of the Austrian central bank. Combining different household microdata sources, the authors assess the impacts of macroeconomic scenarios (changes in interest rates, the unemployment rate, asset prices and the exchange rate) and thereby test households' ability to pay their debts. The scenario of rising unemployment is quantified for employed household heads by modelling the probability of becoming unemployed in relation to demographic and socio-economic characteristics. The results reveal that rising interest rates have a larger negative impact on households' ability to repay than rising unemployment, due to the fact that approximately two-thirds of Austrian debtors have variable rate loans. The banking sector's potential losses resulting from the shocks considered do not compromise financial stability, but a risk is identified in the case of foreign currency loans due to potential exchange rate changes. Stress test methodologies of other central banks are presented, for example, in Holló and Papp (2007) for Hungary, Karasulu (2008) for Korea and Djoudad (2010) for Canada.

The indebtedness of Czech households over the period 2000–2008 is described in Bičáková et al. (2010) using Household Budget Survey (HBS) data. The authors construct a debt ratio defined as the ratio of loan repayments to household income minus the living minimum.[3] The results are compared with the Statistics on Income and Living Conditions (SILC), which contain an indicator of loan repayment difficulties. Such difficulties are consistent with a debt burden ratio in the HBS statistics of above 30%. The authors propose this cut-off point as an indicator of overindebtedness. Jakubík (2010) also addresses stress testing of Czech households, but unlike Bičáková et al. (2010) has only limited microeconomic data available and so simulates some data using assumptions about their distributions. To define distressed households, the study uses the financial margin, defined as net monthly income minus debt service costs and essential living costs.

All the non-Czech studies described above work with microeconomic data and analyse how households' distress – usually defined using their financial margin – changes in response to shocks to unemployment and interest rates. In some cases, other types of shocks – such as a change in the exchange rate – are considered, but the most well-developed and discussed scenario is that of a rising number of distressed households due to rising unemployment. Our chosen approach to stress testing reflects the microdata available in the Czech Republic and is based mainly on Albacete and Fessler (2010) and Johansson and Persson (2006). In the change in unemployment scenario, these studies only consider the case of employed individuals becoming unemployed, whereas in our methodology we also consider transitions from unemployment to employment.[4] The household micro data we use also allow us to model transitions between labour market states for all adults in a household. The following section gives a more detailed description of the stress test methodology used at the CNB.

3. HOUSEHOLD STRESS TEST METHODOLOGY AT THE CNB

The household stress tests conducted at the CNB since 2011 (see FSR 2010/2011, section 2.3, p. 37) use the Household Budget Survey (HBS) for 2011 as their main data source. The other data sources include publicly available macro-indicators and the Statistics on Income and Living Conditions (SILC) for 2011. The HBS contains household-level data. This means that our methodology is microeconomic in nature, although it does allow us to make conclusions for the entire sector. The tests are based on a sample of 2,904 households, of which 1,069 were servicing some sort of loan in 2011.[5] Table 1 presents the average characteristics of households with and without debt. These numbers reveal that households with debt have

2 The authors assume that 40% of loans to households are variable rate loans. The effects of shocks to interest rates are quantified in the short and long term. In the short term a change in rates only affects variable rate loans, while in the long term it affects the entire debt stock.

3 The living minimum is declared by the Ministry of Labour and Social Affairs and covers minimum living costs in relation to the demographic composition of the household.

4 Shocks to unemployment influence not only the probability of becoming unemployed, but also unemployed persons' chances of returning to work.

5 Loans are broken down into three categories: housing loans, consumer loans and other loans.

TABLE 1

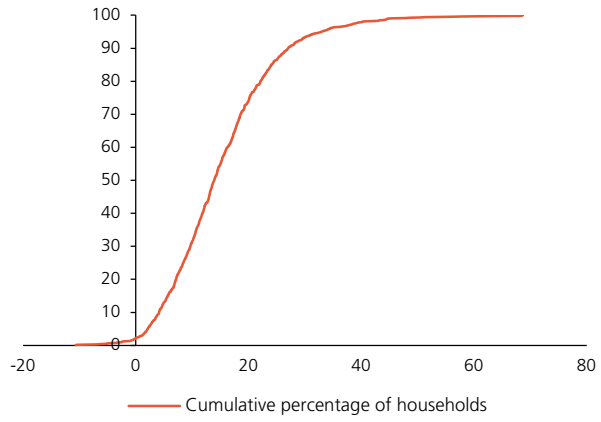
AVERAGE CHARACTERISTICS OF HOUSEHOLDS WITH AND WITHOUT DEBT
(Average for 2011

Indicator (average)	Households	
	With Debt	Without Debt
Net income (CZK/month)	33,733	26,043
Instalments (CZK/month)	4,634	0
Principal (CZK)*	479,121	0
Essential expenditure (CZK/month)	13,223	11,609
Financial surplus (CZK/month)	15,876	14,434
Age of head**	44.3	54.2
No. of persons**	2.80	2.14
No. of children**	0.98	0.49
With mortgage**	49.6%	0.0%
Unemployment rate**	5.1%	7.9%
No. of households in HBS	1,069	1,835

Source: HBS 2011
Note: * Estimate only ** As of 31 December 2011

CHART 1

FINANCIAL SURPLUS DISTRIBUTION FUNCTION
(FS in CZK thousands/month on x-axis; % on y-axis)



Source: HBS 2011, authors` calculations
Note: Only includes households with debt. Outliers excluded.

a larger financial surplus, defined as net monthly income minus essential expenditure and debt service costs. The main reasons for this larger surplus include higher job income if employed and a lower unemployment rate.

The HBS does not contain household balance sheet data. This limits the stress test methodology to some extent. In particular, it is not possible to simulate a shock in the form of a fall in housing prices, as data are not available on the value of the property owned by households. However, the majority of Czech households use their property as their own place of residence. This limits the potential impacts of a fall in prices of real assets on their budgets.[6] The methodology also excludes the impacts of an exchange rate shock, but this is not a substantial limitation either. Exchange rate changes negatively affect household budgets primarily via foreign currency debt. However, Czech households have virtually no foreign currency loans. Consequently, Czech households, unlike their counterparts in some other European economies, are not exposed to the risk of domestic currency depreciation and subsequent growth in the domestic currency value of debt.

The risk of the Czech household sector transforms into credit risk of the financial sector via household debt. These stress tests therefore try to quantify this risk using an estimate of the percentage of distressed households. Here, distress is linked with the probability that the household will fall behind on its debt payments, and is defined with the aid of the "financial surplus" (FS):

$$FS = NI - EE - INST, \qquad (1)$$

where NI is the household's net monthly income, EE is its essential monthly expenditure and INST are its monthly instalments. We identify the household as distressed if this indicator is negative following the application of the chosen scenario.[7] The sensitivity of the percentage of distressed households to the position of the distress threshold can be illustrated using a distribution function (see Chart 1). At FS values only just above CZK 0/month, we observe a very rapid increase in the slope of the distribution function. This means that with such a distress threshold there would be a relatively high risk of incorrectly determining the percentage of distressed households. However, our chosen threshold lies in the band of low sensitivity of distressed households to the FS. This reduces the risk of inaccurate simulations.

Three types of shocks are simulated in the stress tests. Each of them has an impact on the variables entering the financial surplus calculation in equation (1). Shocks to unemployment influence households' wages and therefore also their net income (NI). Shocks to interest rates affect instalments (INST). And finally, shocks to prices affect essential expenditure (EE), defined as the sum of

6 The impacts of changes in property prices are studied in detail in this Report in Brůha, Hlaváček and Komárek (2013).

7 A zero distress threshold is also used, for example, in Albacete and Fessler (2010) and Johansson and Persson (2006).

expenditure on food, energy, transport, health and, where applicable, rent. In contrast to last year's household stress tests (FSR 2011/2012), we determine distress using the absolute financial surplus rather than the previously used ratio of debt to disposable income reduced by essential expenditure.[8]

The simulation of shocks to unemployment is based on a breakdown of all adults in the HBS into three categories by economic activity: working (state E), unemployed (state U) and economically inactive (state O). We assume that the number of economically inactive persons is constant.[9] The simulations are conducted on data covering the heads and second adults of households. Transitions between labour market states are calculated using model (2), where a dummy for unemployment of the given person u_i enters as the dependent variable.

$$p(u_i|x_i) = \phi(z_i)$$
$$z_i = \alpha + \beta x_i, \qquad (2)$$

where $p(u_i|x_i)$ is the probability that person i is unemployed (given their reported characteristics x_i), α is a constant, β is a vector of coefficients and ϕ is the cumulative distribution function of the standard normal distribution. Persons outside the labour market, such as students and women on maternity leave, do not enter the estimate of the coefficients of this model and are assumed to remain economically inactive over the time period considered. This assumption is broadly consistent with the evidence (especially in the short run). As an explanatory variables we use socio-demographic and partly also financial variables contained in the HBS: education, gender, age, demographic characteristics, labour market state and net income of other household members, and dummies for region, housing type, mortgage repayment, ownership of durables (e.g. a car) and social income as main source of income. The resulting model assigns a probability of unemployment to each person based on the existing data.

A rise in unemployment is simulated by increasing the constant α of model (2) until the rate of employment of the entire set of households reaches the required level.[10] The simulation of changes in unemployment assumes transitions from employment to unemployment and vice versa. In the case of becoming unemployed, we assume that the person's net work income is replaced by unemployment benefit while the income of other household members remains constant. The amount of unemployment benefit is determined by previous net work income and by demographic characteristics (age).[11]

For the simulation, we need to assign a potential wage to those who find jobs. This wage is determined using the standard Heckman (1979) model, which takes selection into employment into account. The model is expressed in the first equation by a regression relationship between the logarithm of the wage and socio-demographic variables. In addition, it contains a variable relating to the probability of the person being unemployed. This variable is obtained from the second equation of the model, referred to as the selection equation.[12] In this way, persons whose wages we do not know, i.e. unemployed persons, are also taken into account in the estimates of the coefficients for the wage calculation.

After applying the relevant scenario, we assign to each person a probability of being unemployed after the shock to unemployment. For every possible combination of employment and unemployment for the household head and the second adult, we calculate the household's net income (NI) and the resulting financial surplus (FS) and use the this to assess whether the household in the given state is distressed (a binary variable taking a value of either 0 or 1).[13] The resulting distress is calculated for each household as the average of these binary variables weighted by their probability of occurrence.

To apply the interest rate shock we need to know the maturities of, and interest rates on, each household's debt. This information, however, is not available, so in both cases we use average characteristics based on aggregate CNB data. The new instalment amount is determined by applying the new rate and the average maturity. We assume that households pay their debts in monthly instalments,

8 We abandon the INST/(NI-EE) ratio conceptually similar to that used in Bičáková et al. (2010).
9 Labour market flows between employment and unemployment on the one hand and inactivity on the other are relatively small.
10 The same approach was used in Albacete and Fessler (2010) and Johansson and Persson (2006).
11 Simulation of changes in net household income given a transition between employment and unemployment is used, for example, in Galuščák and Pavel (2012).
12 The model contains dummies for education, gender, age, presence of a second adult in the household and their labour market state, and region. The variables identifying selection into employment are net income of other household members and dummies for children, mortgage repayment, ownership of selected durables and social income as main source of income.
13 We simultaneously assume that the change in labour market state is independent in the case of two adults in one household.

TAB. 2

MACROECONOMIC SCENARIOS

Scenarios	Unempl. Rate	Wages	Inflation	Interest rates
2011	6.7	2.4	1.9	6.6
2012	7.3	2.7	3.2	6.3
2013 Baseline Scenario	7.9	1.2	1.7	6.0
2013 Protracted Depression	8.5	-1.0	1.7	6.1

Source: Inflation report II/2013, Stress test of banks
Note: Interest rates are weighted average rates on the stock of loans for each segment (housing, consumer, other). The weights are based on data from the HBS. "Wages" refers to average nominal wage growth.

TAB. 3

STRESS TEST RESULTS

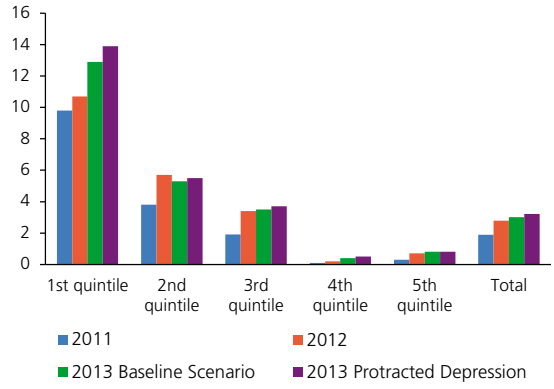
	2011	2012	2013	
			Baseline Scenario	Protracted Depression
Distressed households (%)	1.9	2.8	3.0	3.2
Average FS (CZK/month)	15,921	16,351	16,482	15,829

Source: HBS 2011, authors` calculations

a simplification that largely fits the facts. The HBS contains instalments broken down by housing loans, consumer loans and other loans. The average residual maturity is assumed to be 18 years for housing loans, 2 years for consumer loans and 5 years for other loans. The average weighted residual maturity for all loan types was thus set at 13 years. The rise in rates of newly granted loans is not reflected fully and immediately in the instalment amount of each loan, because in reality the rates on most loans are fixed for some period. For housing loans, the average residual fixation period is assumed to be 18 months. This figure was used to estimate the coefficient determining the percentage of mortgages subject to re-fixation over the next year at 0.66.[14] For consumer loans, the rate is assumed to be fixed over the entire life of the loan. For other loans, by contrast, we assume that the change in rates is reflected immediately and fully in the instalment amounts. The price shock is modelled by increasing essential expenditure (EE) by the rates of inflation of the individual consumer basket items. The essential expenditure items are assumed to be price inelastic.

CHART 2

PERCENTAGE OF DISTRESSED HOUSEHOLDS BY INCOME QUINTILES



Source: HBS 2011, authors` calculations

4. STRESS TEST RESULTS

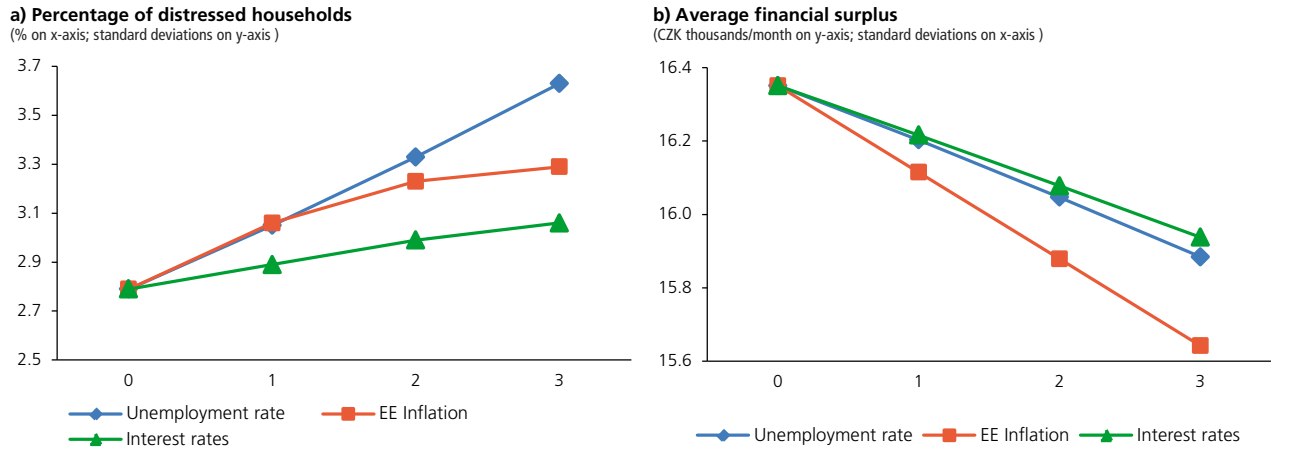
At the time of publication of this Financial Stability Report the HBS had a lag of almost a year and a half, so we need to consider changes in household distress that occurred between the end of 2011 and the end of 2012, to which the impacts of the scenarios for 2013 are related. To do so, we use publicly available macroeconomic data; for all households, prices of essential goods are increased by their rate of inflation, while interest rates on the individual loan types and the unemployment rate are changed according to the actual situation in 2012 (see section 3). In the case of realisation of the Protracted Depression and Baseline Scenario in 2013, however, the simulation of future distress is not performed by applying the above methods to the 2012 simulation results. This is because the 2012 calculations do not provide an unambiguous assignment of household members' labour market state or income; they only give the probabilities of each state. The 2013 results are thus obtained by calculating the cumulative changes in the variables under study for the entire period from the end of 2011 to the end of 2013 in one step. The additionally calculated results for 2012 are thus not used as an input for the subsequent simulation. Table 2 presents the macroeconomic scenarios for the stress tests of the household sector. Both the Baseline Scenario and the Protracted Depression correspond to the scenarios from the bank stress tests for 2013.

The impact of the shocks on households is assessed by comparing the percentage of distressed households before

14 This coefficient is employed for one-off shocks only (see Chart 3a). In the case of the macroeconomic scenario simulations, the average interest rates on the stock of loans are known directly (see Chart 2).

CHART 3

HOUSEHOLD RESPONSES TO MACROECONOMIC SHOCKS



Source: HBS 2011, authors` calculations
Note: EE stands for essential expenditure. The charts plot the variables' reaction relative to the end of 2012 in the event of a 1–3 standard deviation shock to the individual variables. Zero on the x-axis therefore corresponds to the starting point at the end of 2012.

and after the simulation[15] in the individual income quintiles.[16] Low-income households are most sensitive to the stress scenario. The percentage of distressed households increases in reaction to the stress scenario in the other income quintiles as well. Household distress has been edging up since 2011. The level of distress is lower than the results published in FSR 2011/2012 because of its different definition. Table 3 and Chart 2 summarise the stress test results.

We now examine the question of what influence the individual types of macroeconomic shocks under consideration have on household distress. In this case, our starting point is the end of 2012, with which we compare the level of distress after a 1–3 standard deviation shock to unemployment, inflation of essential expenditure and interest rates.[17] The overall increase in the percentage of distressed households in the event of an increase of three standard deviations in the variable under consideration would be largest for a shock to the unemployment rate, smaller for a shock to essential goods inflation and smallest for a shock to interest rates on loans to households (see Chart 3a). These results are due to the negative impacts of the said shocks on the average financial surplus of households (see Chart 3b).

5. CONCLUSION

This thematic article presents a stress test methodology and stress test results for Czech households. The tests allow us to simulate the effects of macroeconomic shocks to employment, interest rates and inflation. Growth in these variables has a negative effect on indebted households, reducing their available financial surplus as a result of a fall in income, an increase in debt service costs or an increase in essential living costs. These factors lead to a rise in the percentage of distressed households, i.e. households having difficulties paying their debts. The stress tests indicate that low-income households are the most vulnerable group with regard to both the level of distress and its sensitivity to macroeconomic shocks. The presented methodology can be used alongside the currently employed macroeconomic credit risk model as an alternative way of calculating households' average probability of default, which enters the bank stress tests. This methodology is a significant refinement of the one presented in FSR 2011/2012.

15 This percentage cannot be compared directly with the non-performing (NPL) loan ratio mainly because of households that are behind on their debt payments are not weighted by loans' principals.
16 The quintiles are determined according to the income of the entire sample of households regardless of whether or not they hold a loan. For this reason, the number of households in the individual quintiles shown in Chart 2 is not the same, as they contain only households with loans.
17 The standard deviations are computed for the period January 2002–December 2012. One standard deviation equals 1.39 pp for the unemployment rate, 1.73 pp for EE inflation and 0.74 pp for interest rates. Assuming a normal distribution, the probability of a shock of one, two and three standard deviations is 15.9%, 2.3% and 0.1% respectively.

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IMPACTS OF HOUSING PRICES ON THE FINANCIAL POSITION OF HOUSEHOLDS

Jan Brůha, Michal Hlaváček, Luboš Komárek

This article examines the extent to which housing prices affect the balance sheets and borrowing and consumption decisions of households in the Czech Republic and indirectly also their ability to repay their debts. Empirical results were obtained by applying the Propensity Score Matching (PSM) method, which allows us to compare statistical units (households) having a different key characteristic (owner-occupied versus rented housing) and similar observed other characteristics. The article concludes that in the period of fast growth in housing prices there were differences between households not only in consumption and net savings, but also in saving structure. However, the analysis does not confirm the assumption made by many theoretical models that there is a credit channel from housing prices to GDP. On the contrary, it was found that property-owning households have statistically significantly higher net savings on average than households living in rented dwellings, even at a time of surging housing prices.

1. INTRODUCTION

Central banks regularly analyse the property market, since housing prices are significantly correlated with macroeconomic dynamics (Leamer, 2007) and financial variables. Housing price misalignment[1] implies both a greater risk to the financial stability of a country/region if the ratio of mortgage loans to total loans is high, and greater social tension. From the point of view of achieving financial stability, therefore, it is vital to study the relationship between housing prices and housing loans and the impacts on households' ability to repay those loans and on the value of the related collateral.

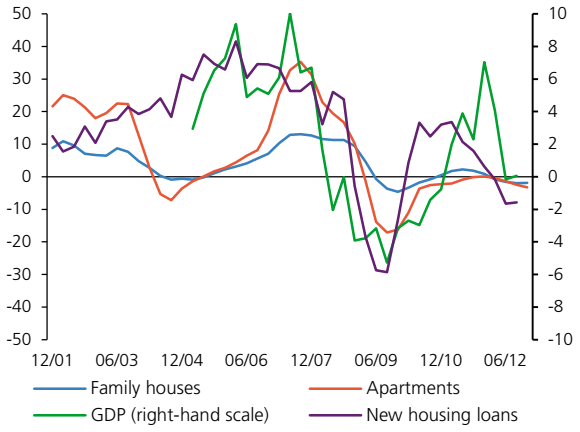
Housing prices in the Czech Republic exhibit strong cyclicality, especially so in the post-Lehman period. Apartment prices are more correlated with the business cycle than prices of family houses. The correlation between economic performance and new housing loans and between housing prices and housing loans is very close (see Chart 1).

On the aggregate level, two factors seem relevant to the interaction between the real economy, housing prices and housing loans: the wealth mechanism (a rise in housing prices implies growth in households' wealth, which, in turn, drives up their consumption) and the credit mechanism (a rise in housing prices reduces the credit constraints on a percentage of households by increasing the value of property as potential collateral).

CHART 1

CYCLICALITY OF HOUSING PRICES IN THE CZECH REPUBLIC

(year-on-year growth in %)



Source: CZSO, CNB, HB Index
Note: Transaction prices of apartments/family houses; 2011/2012 data preliminary or approximated from alternative data sources.

Different types of interaction between housing prices and the economic cycle naturally have different economic policy implications. If housing prices cause business and financial cycles,[2] it is reasonable to consider including housing prices in monetary (or, more generally, stabilisation or macro-prudential) policy decision-making. If housing prices are a mere symptom[3], there is no reason for monetary or macroprudential policy to react to them.[4] Finally, if studies asserting that housing price fluctuations are caused by

1 By misalignment we mean a situation where market prices of real estate are out of line with their hypothetical "equilibrium" value linked to the fundamental factors affecting those prices.

2 See Leamer (2007).
3 This is e.g. a case of models based on self-fulfilling expectations (see Kahn, 2008)
4 A possible exception is if the central bank has better information than private entities about future economic development.

institutional or behavioural failures are right,[5] housing prices should be the domain of, for example, institutional regulation or financial literacy policy rather than macroeconomic stabilisation policy. For this reason, it is important to analyse the cause of the observed relationship between housing prices, credit market conditions and macroeconomic dynamics. This is one of the contributions of this article.

The credit mechanism was pioneered in Iacoviello and Neri (2010), which became the inspiration for most applied DSGE models working with a property sector. This model formalises the relationship between housing prices and macroeconomic dynamics as follows. In the first phase a rise in housing prices increases the value of property as loan collateral, leading to credit expansion. This expansion increases aggregate demand, which, in turn, fosters a temporary rise in economic activity. In the second phase, as the rise in housing prices dissipates, the value of the collateral falls and economic agents have to repay their debts and curb their spending. This, in turn, causes a downturn in economic activity. In this way, housing price shocks, which can be endogenous, create a boom-bust cycle. Housing prices can also affect the financial position of households if this credit channel operates via the income effect, with growth in housing prices increasing the value of households' financial assets and thus also their marginal propensity to consume (see Case, Quigley and Shiller, 2005).

The link between housing prices and household borrowing can be tested using household budget statistics. A quick comparison of the aggregate statistics on loans of owner-occupier households and renting households reveals a similar response of loans over the cycle, indicating that the modelling framework of Iacoviello and Neriho (2010) is not necessarily correct for, or relevant to, the situation in the Czech Republic. However, the above comparison of the aggregate statistics may not be appropriate, as the two sets of households may, for example, be heterogeneous. We therefore apply a more advanced econometric technique to the problem – Propensity Score Matching (PSM).

If the above-mentioned mechanisms of transmission of housing prices to the real economy are indeed relevant, a rise in housing prices should be accompanied by an increase in debt and or a fall in the saving rate among the types of households that own property, and conversely the debt of households living in rented dwellings should not react to housing prices.

The overall aim of this article is to use the data available for Czech households to empirically test the strength and extent of the effect of housing price movements on households' balance sheets, i.e. on their borrowing and consumption decisions, and indirectly on their ability to repay their debts. In doing so, we will investigate the relevance of the transmission mechanism between the property market and macroeconomic dynamics using the commonly used model of Iacoviello and Neri (2010). It assumes that housing prices affect the macroeconomic environment via credit expansion, with property acting as collateral. The first objective of the article is therefore to determine whether property-owning households did indeed borrow significantly more than, for example, households living in rented dwellings when housing prices were high. The second objective of the article is to investigate the relationship between housing prices and households' propensity to save. Here, we focus on testing the income effect hypothesis, according to which property-owning households have a lower propensity to save than households that live in rented accommodation when housing prices are rising, even when different income levels are taken into account.

The article is structured as follows. In Section 2 we describe the data sources used and define the variables under study. In Section 3 we use the PSM method to analyse differences in consumption and saving between households that own a house or apartment and households living in rented dwellings.

2. DATA SOURCES AND BASIC DEFINITIONS

The main data source for our empirical analysis is microeconomic information from the Household Budget Statistics (HBS) published annually by the Czech Statistical Office (CZSO).[6] The same database is also used as a source for the household stress tests published regularly in the FSR.[7] This article uses the HBS data for 2006–2011, which span at least one housing price cycle (see Chart 1).[8] The HBS

5 For example the model proposed in Piazzesi and Schneider (2008), which uses inflation illusion among economic agents to explain fluctuations in housing prices.

6 Around 3,200 households are polled for the HBS survey each year.
7 The household stress test methodology is described in another thematic article in this Report – Hlaváč, Galuščák and Jakubík (2013).
8 Namely, the surge in housing prices in 2006–2008, the subsequent fall in prices in 2009 and the continuing decline in 2010–2011. The data for the pre-2006 period, when housing prices also showed interesting dynamics, could not be used because of limited comparability of the source data.

database contains: (i) detailed information on the income and expenditure of individual households broken down by type (flow data for the given year); (ii) other socio-economic characteristics of households (e.g. age of household members, number of children, economic activity of household members, education of household members, living minimum of household); (iii) information on debt type and repayment size for various types of loans (broken down into goods repayments, house purchase loan repayments and other loan repayments);[9] (iv) information on housing type (regulated/unregulated rent, cooperative, own house/apartment, etc.). The HBS database also contains information on the locality in which the household lives/owns property (region and municipality size) and on housing type, period of construction, equipment, floor area and so on.

The last-mentioned type of HBS information allows us to link the HBS data to the regional data on property transaction prices, published also by the CZSO. These prices are broken down by property type (apartment versus family house) and by region. For each region the prices are further broken down by municipality size. This means that for each household we can estimate the "shadow" value of the property it owns and track how price changes are reflected in its consumption and saving decisions. The price data are shown in Chart 2. Besides the general trends in housing prices they reveal increasing price differentiation across regions over time, with apartment prices in smaller municipalities rising more slowly than prices in the biggest cities. Another interesting piece of information is that although housing prices show similar trends across regions, their dynamics are not entirely homogeneous and there are frequent changes in the price rankings of individual regions.[10]

For the purposes of this article we worked with the following categories derived from the Household Budget Survey. *Consumption* contains households' expenditure on food, manufactured goods and services, excluding consumption in kind. *Gross income* comprises all money income[11] of all household members net of savings drawn, loans received and income from the sale of property and securities. *Taxes* consist mainly of income tax, property and inheritance tax and administrative and other fees. *Gross savings*[12] include new deposits, newly granted loans, purchases of securities in the given period, supplementary pension schemes and other types of insurance, private enterprise costs, property purchase expenditure and other investment in dwellings, and loan repayments. *Gross borrowings*[13] are items that reduce households assets, specifically savings drawn, various loans received, income from the sale of securities and income from the sale of movables and immovables in the given period. We then define *net savings* as *gross savings* minus *gross borrowings*[14] and *net income* as *gross income* minus *taxes* plus *gross borrowings*. Finally, we define the *saving rate* as *net savings* divided by *net income*. According to the above definitions, the following identity must hold:

$$\textit{Gross income} - \textit{Taxes} \equiv \textit{Consumption} + \textit{Net savings}$$

3. METHODS AND RESULTS

The empirical part of this article focuses on whether and how property ownership affects the following relationships: (i) the dependence of *consumption* on *net income*, (ii) the dependence of the *net saving rate* on *net income* divided by the *living minimum*, (iii) the dependence of the *gross borrowing rate* on *net income* divided by the *living minimum*.

The task of comparing households' consumption, saving and borrowing is complicated by the fact that households owning different types of property can display systematically different behaviour, influenced mainly by their position in the life cycle or to different sensitivity of expenditure and income to the business cycle and the risk of unemployment during a recession. For this reason, we apply a more

9 The HBS does not contain information on the stocks of individual types of loans, but merely provides an identifier of whether or not the household has a particular type of loan. It also gives information on the flow of loan repayments for the year and on the drawdown of new loans, from which the amount of loans taken out can be estimated only indirectly and not entirely accurately (it does not contain information on the interest rate or residual maturity of the loan).

10 For example, as regards prices in municipalities with a population of less than 2,000, Ústí nad Labem, Moravia-Silesia, Olomouc, Pardubice and Karlovy Vary have been alternating in the role of region with the lowest apartment prices.

11 i.e. income from main employment, income from self-employment, pensions and other social benefits.

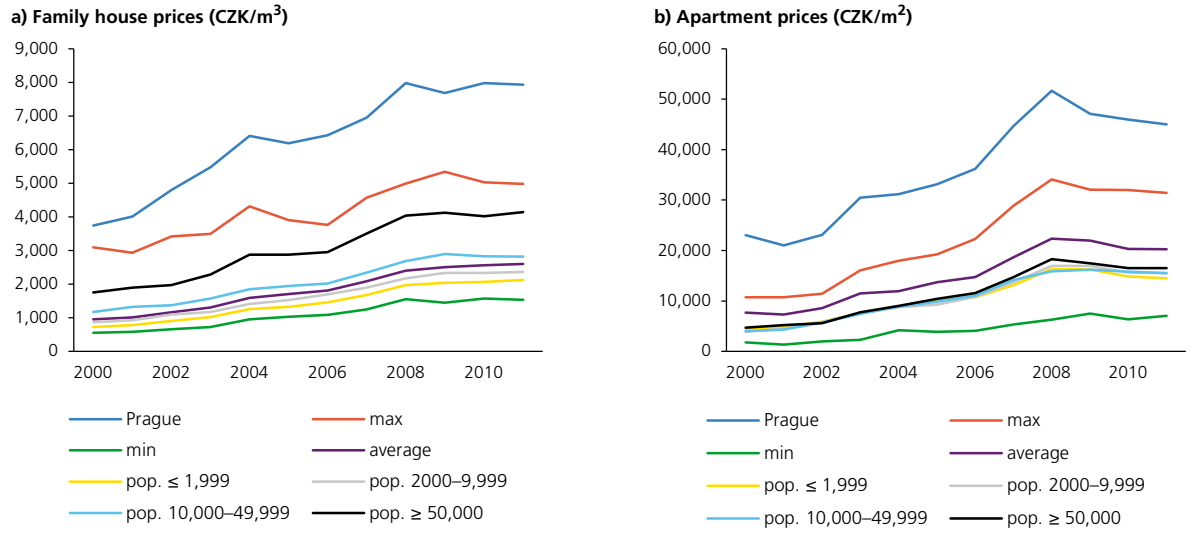
12 Gross savings and other variables (net savings, deposits, loans provided, gross borrowings, etc.) are treated in the HBS methodology as flow variables linked to the change in the stock of the variable for the given year (for example, new deposits of households are referred to as deposits in the HBS).

13 This is again a flow variable, which should rather be referred to as "gross borrowing", which often has a counterpart within gross savings.

14 Net savings are thus accompanied by a change in the stock of assets of households, although equality does not hold. However, the differences arising from the revaluation of accumulated assets, which are negligible for a large proportion of assets (e.g. deposits with banks), can be substantial in the case of immovable assets.

CHART 2

STRUCTURE OF PRICES IN THE CZECH REPUBLIC



Source: CZSO, authors' calculations
Note: Transaction prices; maximum for Czech Republic excluding Prague; likewise average prices for municipalities with a population of 50,000 or more.

sophisticated econometric technique – Propensity Score Matching (PSM) – to the problem.

The PSM method is based on comparing statistical units that have a different key characteristic (in this article the statistical units are households and the key characteristic is that they live either in a dwelling that they own or in a rented property) but similar observed characteristics in some sense. The PSM method therefore allows us to analyse the effect of the key characteristic on chosen indicators while taking into account the heterogeneity of the statistical units' observed characteristics.[15]

To better explain the PSM method, let us consider the situation where – apart from the key characteristic to be compared – the statistical units differ in only a few discrete features (e.g. education or household type). In this case, it is possible to conduct a statistically valid comparison within each group and the resulting estimate of the effect in the population will be a weighted average of the estimated effects in the individual subpopulations.

If there are many relevant features, it is clearly impossible to construct just a few homogeneous subpopulations containing a sufficient number of observations. However, Rosenbaum and Rubin (1983) proved that if certain assumptions are met, the comparison of statistical units will remain valid if it is performed on the basis of the so-called propensity score. The propensity score is a one-dimensional metric indicating the probability that the statistical unit under consideration either has or does not have the key characteristic under study. In other words, the PSM method enables us to reduce multidimensional heterogeneity into a single dimension (the propensity score) and perform a valid comparison of the statistical units under study on the basis of this one dimension.

Formally, the method is based on estimating the probability that a particular household belongs to a particular group (most frequently defined by the discrete choice method) and then matching households that have a similar probability of belonging to a particular group but in reality belong to different groups. In this way it is possible to filter out the heterogeneity in the composition of the individual groups. Econometric details on the implementation of the PSM method can be found, for example, in Caliendo and Kopeinig (2005).

15 The PSM method is used mainly in the medical sciences (e.g. to investigate the impact of a particular therapy) and in microeconomics (e.g. in the study of active labour market policy or the provision of support to firms in disadvantaged areas) to assess the effects of a particular treatment on a population. In such cases, the key characteristic is usually whether or not the unit under study was exposed to this treatment (therapy, unemployment training, grant) – see, for example, Gertler et al. (2011). Our article demonstrates that the PSM method has a wider application than just assessment of the effects of intervention (medical or economic).

TABLE 1

ESTIMATES USING PSM METHOD

	Indicator / Unit	Consumption (absolute in CZK)	Net savings (% of net income)	Gross borrowings (% of net income)	Deposits (% of net income)	House/apartment loan repayments (% of net income)	Savings drawn (% of net income)
Rental vs. own apart., 2007	Point estimate	-20,048	-0.17	6.84	9.76	1.15	6.81
	p-value	*0.01*	*0.50*	*0.00*	*0.00*	*0.00*	*0.00*
Rental vs. own house, 2007	Point estimate	-28,239	9.24	2.36	6.33	1.07	2.41
	p-value	*0.00*	*0.00*	*0.04*	*0.00*	*0.00*	*0.02*
Rental vs. own apart., 2008	Point estimate	-16,734	1.29	4.43	6.73	1.02	5.07
	p-value	*0.05*	*0.25*	*0.02*	*0.00*	*0.00*	*0.00*
Rental vs. own house, 2008	Point estimate	-49,782	6.27	-3.46	-2.21	1.34	-3.58
	p-value	*0.00*	*0.00*	*0.01*	*0.08*	*0.00*	*0.00*

Source: CZSO, authors' calculations

We applied the PSM method to the data described in the previous section for the period 2007–2008, when housing prices in the Czech Republic recorded the strongest growth.[16] For the comparison, we only used data for households that live in dwellings for which housing prices recorded growth exceeding the 25th percentile of the growth distribution.[17] These dwellings were identified according to municipality size and region.

We performed the following two types of comparison using the PSM method: (a) households living in rented housing versus households living in their own apartment, (b) households living in rented housing versus households living in their own family house. We also experimented with households living in cooperative apartments, and we also attempted to divide households in rented housing into those which have regulated rent and those which have unregulated rent, and property-owning households into those with and those without a house purchase loan. In all cases, however, we lacked sufficient observations, so many of the results were insignificant.

The first step of the method (estimation of the propensity score) was performed using a probit model in which the explained variable was the indicator of whether the household owns a property (house or apartment). The set of explanatory variables consisted of net income, net income normalised by the living minimum, social group, number of pensioners in household (relative to number of persons), number of consumption units (weighted number of household members according to OECD methodology, where children are assigned lower weights according to their age), sex, age and education of head of household, age and education of spouse (where present), municipality type, period of construction, total floor area, number of rooms and internet access. The socio-demographic characteristics control for households' different expected income potential, and the variables relating to the amenities of the property control for the level of wealth. The inclusion of these variables means that the PSM method should yield a valid statistical comparison.

Table 1 shows the results of the point estimates of selected indicators and their statistical significance. The presented p-values were calculated using the bootstrap method. The data are interpreted as follows: for example, the figure -20,048 (column "Consumption", row "Rented vs. own apart., 2007") means that a household living in its own apartment spent CZK 20,048 less on consumption in 2007 than a comparable household living in a rented apartment. Likewise, the figure 9.24 (column "Net savings", row "Rented vs. own house, 2007") means that the net savings of households living in their own houses were 9.24 percentage points higher than those of households living in rented dwellings in the given year.

Table 1 points to some interesting results. First, during the period of rising housing prices, consumption was, *ceteris paribus*, lower in property-owning households than in renting households; this effect is statistically significant.

16 We also applied the method to the preceding period but did not identify significant differences between property-owning and non-property-owning households for that period.

17 This is important because even in 2007 and 2008 average housing prices fell for some types of dwellings. The chosen 25th percentile of the housing price growth distribution by dwelling type corresponds to 10% growth in house prices in both 2007 and 2008, 20% growth in apartment prices in 2007 and 15% growth in apartment prices in 2008.

House-owning households have statistically significant higher net savings than households in rented housing on average.[18] These two observations directly contradict the mechanism of the effect of housing prices on macroeconomic dynamics as described in the model of Iacoviello and Neri (2010). So, if this mechanism is present in reality, it is evidently not significant.

This result is in line with studies in other countries, which also show (although there is no consensus in the literature) that growth in the consumption of property-owning households and households that use rented housing is quantitatively very similar after adjustment for household type.[19] We can therefore say that the results of microeconomic studies do not corroborate the relevance of the credit mechanism described in the introduction to this article and thus do not support the way in which many DSGE models are currently being extended. Paradoxically, this way of extending such models is popular in international institutions and some central banks.[20]

As the comparison was performed using the PSM method, these results cannot be explained by different socio-demographic compositions of owner-occupier households and households in rented dwellings. It is theoretically possible that these households differ in unobserved characteristics (such as "impatience to consume"). This may also be intuitive: more patient (thrifty) households may be more likely to be able to save money for their own housing and simultaneously have higher net savings even during a boom (such as in 2007 and 2008). If this explanation is right, it would also weaken the relevance of the credit constraint mechanism according to Iacoviello and Neri (2010). This is because impatient households should – at least in the long run – have a lower chance of owning property to use as collateral when necessary.

An alternative possible explanation for the higher savings of property-owning households is that such households are repaying housing loans and this item is part of net savings. Households living in rented dwellings usually report zero for this item. On average, the difference in loan repayments between property-owning and non-property-owning households is around 1.0–1.3% of income, i.e. less than the difference in their saving rates. In other words, higher loan repayments by property-owning households contribute to higher net savings (and lower consumption), but explain only a small fraction of the observed difference in consumption and net savings.

Second, households differ not only in consumption and net savings, but also in saving structure. The results show that property-owning households typically had higher gross borrowings, but these did not outweigh their higher gross savings (both in terms of flows in accordance with HBS terminology). This suggests that such households were changing the structure of their portfolios: on average they were drawing more on their accumulated savings, while reporting higher new (gross) deposits and not surprisingly repaying housing loans. The data show that households drawing on their existing savings were usually saving at the same time – in other words they were restructuring their portfolios.[21] This suggests different financial behaviour by property-owning households, behaviour which is hard to explain by credit constraints.

Third, one might ask what is causing the differences described above. Is it that one group of households contains "atypical" households that have savings, debts or investments of a distinctly different nature? Or is it that the distribution of savings of property-owning households has merely shifted while keeping its shape? For the net saving rate, the data clearly support the second option: the distribution of the net saving rate has a smaller dispersion in the case of property-owning households than in the case of households living in rented dwellings. Otherwise, the distributions for the two groups are similar in shape (see Chart 3).

In the case of gross borrowings (see Chart 3), deposits and savings drawn, the distributions are distinctly bimodal for both types of household: some households report relatively low values of these indicators (below 15% of their income), while others report values exceeding 25%. In the case of owner-occupier households, the latter group is relatively larger. This shows that these households were more likely to have been restructuring their portfolios in the given period (reporting a higher frequency of deposits and saving withdrawals) without getting more into debt than households living in rented dwellings. Consequently, the difference between the types of households under study is

18 The exception is the comparison of households living in rented dwellings with those living in their own apartment for 2007, where the difference in net savings is both economically insignificant (0.17% of net income) and statistically insignificant (p-statistic 0.50).

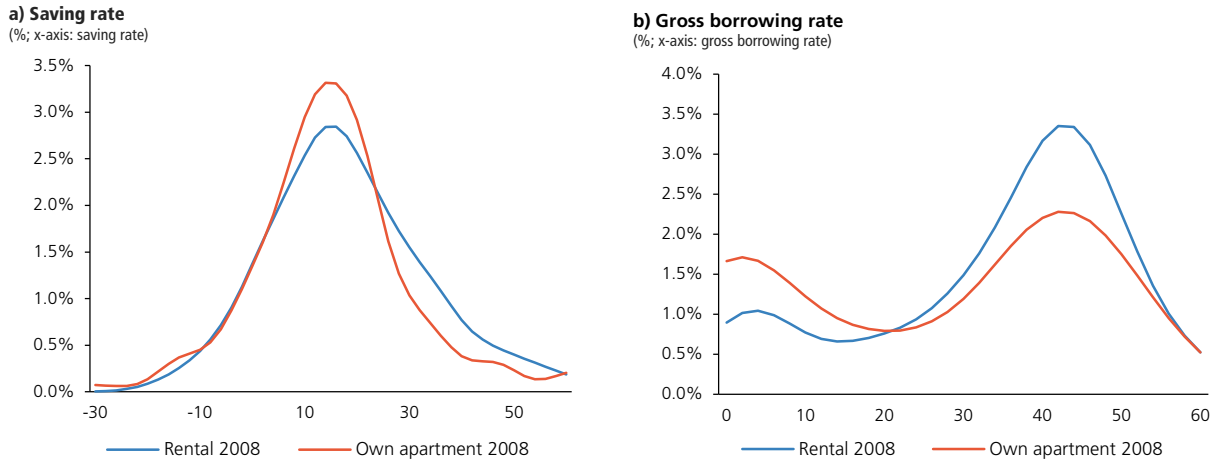
19 See, for example, Attanasio et al. (2009) and Calomiris et al. (2009).

20 See, for example, Walentin and Selin (2010), Christensen et al. (2009) and Lambertini et al. (2010).

21 The exception is 2008 in the case of house-owning households, which have lower gross borrowings and lower savings drawn than households living in rented housing.

CHART 3

EMPIRICAL DISTRIBUTION FUNCTION



Source: CZSO, authors' calculations
Note: Kernel density estimation.

due not to the presence of a significant "atypical" group of households, but rather to different consumption and investment behaviour.

Fourth, it is natural to ask whether property-owning households behaved differently when housing prices were rising compared to when they were falling. For this purpose, we calculated estimates using the PSM method for 2009 and 2010 for households that live in regions where housing prices were indeed falling. According to our results, the above differences between renting households and owner-occupier households persist even at a time of falling housing prices, although they are quantitatively smaller and statistically less significant. This may be due to a smaller number of observations[22] or to lower interest rates and rising refinancing of housing loans, which might have been reflected in lower loan repayments and therefore also in lower net savings in households owning a house or apartment.

4. CONCLUSION

This article set out to empirically test – on data available for Czech households – the strength and extent of the impact of housing price movements on the financial position of households, i.e. on their borrowing and consumption decisions, and indirectly on their ability to repay their debts. The article arrives at two statistically significant findings. The first is that consumption is, *ceteris paribus*, lower in property-owning households than in households living in rented dwellings, and also that property-owning households have higher net savings than households in rented housing. This was particularly the case in the period of rising housing prices, but differences between the two types of households persisted during the recent period of falling housing prices. This finding casts doubt on the relevance of the commonly assumed credit mechanism for explaining the observed correlation between housing prices and macroeconomic dynamics in the Czech Republic. The second conclusion is that households also restructured their portfolios differently depending on their ownership relationship to the property. This different portfolio restructuring was reflected in property-owning households on average drawing more on their existing savings but simultaneously generating more in new deposits, so that their net savings were higher. Not surprisingly, property-owning households also had higher housing loan repayments, which are also part of their savings. However, this difference explains only a small fraction of the observed difference in net savings.

22 In the case of households living in family houses prices did not fall in all the regions under review in 2009–2010, so these households were not included in the PSM estimate for those years.

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MODELLING BANK LOANS TO NON-FINANCIAL CORPORATIONS

Miroslav Plašil, Štěpán Radkovský, Pavel Řežábek

This article aims to characterise the effect of demand and supply factors on bank loans to non-financial corporations and to obtain a forecasting model for the main variables linked with corporate loans. Our estimate of credit supply conditions in the Czech Republic echoes the results of the euro area bank lending survey. The results show that Czech banks significantly restricted credit when the financial crisis erupted, and this was partly reflected in the subsequent economic contraction. The article enhances our picture of the credit market, which, owing to the only recent launch of a bank lending survey in the Czech Republic, had not previously been mapped properly.

1. INTRODUCTION

Bank loans are a key form of external financing of Czech non-financial corporations and a necessary precondition for the future growth of the sector. An analysis of total loans and their dynamics over time can thus yield valuable information on the real sector financing process and foster a better understanding of the relationship between real economic activity and the financial cycle. This knowledge can then be applied in the fields of financial stability (to assess the position in the financial cycle or estimate the path of credit risk) and monetary policy (e.g. to test the functioning of the credit channel of the transmission mechanism).

It is useful to analyse the credit market and the potential impacts of the credit conditions on economic growth separately from the perspective of the two main determinants of total loans, i.e. credit supply and credit demand. From the practical perspective, however, it is quite a challenge to disentangle these two determinants, because for every point in time only the combination of the price (the interest rate) and total quantity of loans is observable, not the demand and supply functions (see Busch et al., 2010). To get a more detailed idea of the effect of individual factors on credit growth, central banks generally conduct a regular bank lending survey (BLS),[1] in which commercial banks assess shifts in their credit standards and, on the other side, provide an indication of firms' and households' interest in borrowing. The Czech National Bank did not launch such a survey until mid-2012. This means it cannot yet use the available data for more extensive analyses.

This article therefore discusses the implementation of a simple empirical model to describe the credit dynamics of non-financial corporations. The model can be used to determine in more detail how much the level of loans was influenced by the supply and demand sides over time. In this way we gain access to previously unavailable information. As even BLS results can be subject to distortions in some circumstances (see Del Giovane et al., 2011), the model outputs can also be used in the future to cross check whether the BLS results are informative and meaningful. The model can also be used to obtain forecasts for the variables analysed.

2. FINANCING OF NON-FINANCIAL CORPORATIONS AND ITS EVOLUTION OVER TIME

The banking sector is the primary financial intermediary in the Czech economy. The capital market – despite having grown over the last five years – still plays only a minor role in funding non-financial corporations (see, for example, Kubicová et al., 2012). Moreover, loans provided by non-bank financial institutions (such as leasing companies) still account for a relatively small proportion[2] of the financing of non-financial corporations. Bank loans and their dynamics are thus crucial to understanding the link between developments in the real economy and movements in the financial sector.

Total bank loans have been growing at quite a pace over the last 20 years. This growth has been driven by a whole range of factors, some of which are easy to capture in data and some are more difficult. These facts complicate the application of existing empirical techniques. The main problem is the question of the long-run stability of the relationships between the variables that characterise credit growth. This problem stems from relatively frequent transitions between fundamentally different time periods,

1 Bank Lending Survey is the official name used by the CNB and other central banks.

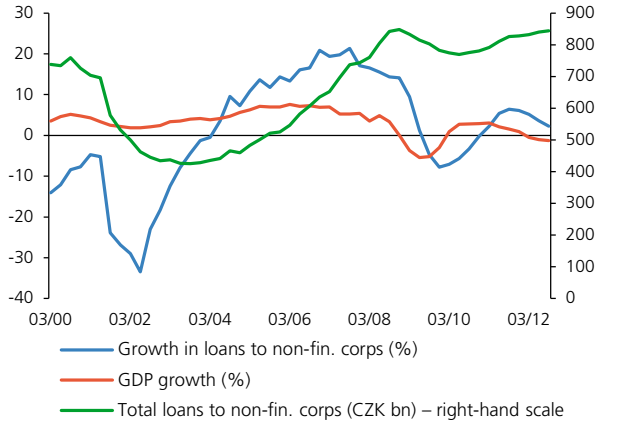
2 In the financial sector, loans provided by non-banks to non-financial corporations have a share of approximately 20%.

most of which have been of a unique or historically conditioned nature.

Given the data availability, we start our analysis of credit growth at the beginning of the last decade (see Chart 1). We can see that total bank loans were initially noticeably affected by banks' efforts to clear their balance sheets of bad loans provided in the 1990s (for more details, see Cimburek et al., 2009). This decline cannot be interpreted as a manifestation of cyclical behaviour caused by the situation in the real economy, as the economy was recording solid positive growth at the time. The decline linked with the clean-up of bank balance sheets gradually dissipated and was replaced approximately during 2004 by buoyant growth in loans in line with economic growth. Year-on-year loan growth peaked at around 20% in 2006 and 2007. Although the credit growth in this period was linked with the improving performance of the Czech economy, it also partly reflected the low initial indebtedness of Czech firms. Owing to the strong export orientation of the Czech economy, the financial crisis and its impacts on the country's main trading partners caused a large contraction in economic activity, reflected in a sharp downturn in credit growth.[3] The subsequent dynamics more or less mirrored the modest economic recovery in 2010 and 2011 and to a large extent also the later renewed recession. In addition to economic contraction, the recent period has been further characterised by an environment of unusually low interest rates.

CHART 1

BANK LOANS TO NON-FINANCIAL CORPORATIONS
(year-on-year growth rates in %; stocks in CZK billions)



Source: CNB, CZSO

3. EMPIRICAL MODEL AND DATA

The purpose of constructing the empirical model is to assess the effect of supply and demand factors on total loans. Likewise, it is also useful to assess how much the economic contraction was exacerbated by banks' credit supply restrictions at the time of the crisis.

There has recently been considerable progress in the analysis of the linkages between the real economy and the financial sector in both the theoretical area (focusing on DSGE models) and the area of developing empirical tools. The two[4] main empirical approaches currently used for these purposes are: (i) models based on cointegration analysis, which try to identify long-run relationships that can be interpreted as demand and supply functions (see, for example, Hűlsewig et al., 2006; Kok Sørensen et al., 2012), and (ii) methods based on VAR models with sign restrictions on the impulse response functions. These restrictions stem from theoretical considerations and allow different types of shocks to be identified (see, for example, Busch et al., 2010; Tamási and Világi, 2011).

For the sake of simplicity, we focus in this article on the former approach, which is based on cointegration analysis and the construction of a vector error correction model (VECM).

3.1 Error correction model

A VECM is a suitable representation of a multi-dimensional system of non-stationary time series which share common (stochastic) trends. Depending on the number of variables, one or more long-run relationships can be identified in the cointegrated system. Similarly to Kok Sørensen et al. (2012), we will focus on the magnitude and direction of the deviations from the long-run equilibrium (cointegration) relationships.

The VECM can be generally written in the form:

$$\Delta y_t = \mu + \Pi y_{t-1} + \sum_{h=1}^{l} \Gamma_h \Delta y_{t-h} + \varepsilon_t \qquad (1)$$

where y_t is an n vector containing the variables under study, matrices Π and Γ contain information on, respectively, the long-run and short-run relationships between the variables, ε is a multi-dimensional white-noise process and μ is

3 We will try to answer the question of how much supply and demand factors contributed to this development in the next section.

4 Apart from these two main techniques, it is also generally possible to use a panel regression approach combining BLS results with individual bank characteristics (Sóvágo, 2011; Del Giovane et al., 2011). However, this approach cannot be applied in the Czech case because the history of the BLS is too short.

a deterministic term (for more details, see, for example, Lütkepohl, 2005).

With respect to our objectives, we primarily focus on the matrix of long-run relationships Π and its estimate. In the case of r cointegrating relationships, Π can be written as the product of two matrices $\Pi = \alpha\beta'$, where α and β are of dimension n x r. The rows of parametric matrix β correspond to the long-run relationships between the variables, and the elements of matrix α give the speed of adjustment to the long-run equilibria. However, the decomposition of Π is not unique and various (although not totally arbitrary) model specifications share identical VECM representation. To obtain unique values of α and β therefore requires further identifying or overidentifying restrictions on the model. In practice, this involves setting certain parameters equal to 0 or 1.

As noted in section 2, the expected instability of the relationships between the variables, makes it quite difficult to estimate the parameters of model (1). One possibility is to shorten the length of the time series used and only estimate the model for a time period in which the role of structural changes can be expected to be negligible. In practice, however, there is no guarantee that this can be done by shortening the series. Moreover, given the number of parameters, one gets into a situation where the model cannot be estimated with sufficient accuracy.

For these reasons, we will additionally estimate an alternative model in which the matrix of long-run relationships β contains time-varying parameters. This modification is meant to capture changes in the cointegrating relationships. When constructing the model, we will now assume that the time-dependent matrix Π_t can be split into two matrices in the form:

$$\Pi_t = \alpha\beta_t \qquad (2)$$

where the matrix of loading coefficients α is defined as before, but matrix β_t can now vary over time (for more details, see Bierens and Martins, 2010). However, we still assume that the number of cointegrating relationships r remains constant over time.

One possible objection to this approach is that cointegration expresses a permanent property of the system, which is not easy to reconcile with the idea of changes in long-run relationships in every period. Instead of the long-run aspect, therefore, Koop et al. (2011) suggest thinking of cointegrating vectors in terms of equilibria towards which the system is attracted at any particular point in time. The key feature is that these relations are slowly changing over time.

3.2 Data

For the purpose of our analysis, the data set of quarterly time series for 2002 Q1–2012 Q3 comprises six variables: total bank loans to non-financial corporations (L), gross domestic product (Y), the interest rate on new loans (r), the CZEONIA interest rate as a proxy for the monetary policy rate (i),[5] the non-performing loan ratio (NPL) and the default rate (DF). The first four variables are the standard indicators used in similar studies (see, for example, Hűlsewig et al., 2006).[6] We expanded this set to include risk rates, which models of this type usually abstract from, but which do have (as we show below) a substantial effect on credit demand and supply. Likewise, their presence in the model is useful for analysing the impacts of credit growth on financial stability.

The time series of total loans and GDP are expressed in natural logarithms. Where the standard time series tests detected the presence of seasonal effects, seasonal adjustment was performed prior to the analysis itself. All the series were tested for the presence of a unit root using the augmented Dickey-Fuller test. The results indicate that all the series can be considered I(1) in the given time period, which naturally gives rise to the error correction model representation.

We estimate model (1) over the period 2005 Q1–2012 Q3 and the time-varying parameter model based on relationship (2) over the period 2002 Q1–2012 Q3. The estimation period for model (1) was shortened because of the above-mentioned problem of bank balance sheet clean-ups, which cannot be adequately captured using a model with fixed parameters. Other argument for shortening the period is a methodological change to statistical reporting of loans and interest rates of non-financial corporations in 2004. Note that the results should be interpreted with caution because of the high number of parameters estimated (due to the number of variables and their lags).

5 The CZEONIA rate was chosen ahead of the probably more commonly used PRIBOR because it more faithfully copied the two-week repo rate during the crisis. However, the PRIBOR gives comparable results.

6 Variables describing firms' investment activity and financing needs (e.g. gross operating surplus) are also often included in such models. We exclude them from our analysis because the data are less reliable in the Czech case. However, omitting these factors may have adverse implications for the correct specification of the model.

3.3 Model construction and estimation

Before estimating the parameters, we need to determine the number of cointegrating relationships. The relevant tests do not give an entirely clear answer in this regard. The most commonly used Johansen trace test indicates the existence of three or four cointegrating vectors depending on the pre-selected significance level (and on the choice of time period). The alternative tests are not entirely unanimous either.[7] For this reason, we need to consider the objectives of the analysis in addition to statistical criteria when determining the number of relationships. Taking into account the test results and the nature of the problem, we set the number of cointegrating relationships at three.

The equation of three cointegrating relationships, together with the estimated parameters and their statistical significance, can be written as follows:[8]

$$L = \underset{6{,}15^{*}}{\beta_{1,1}} Y + \underset{-0{,}06^{*}}{\beta_{1,2}} r + \underset{-0{,}13^{*}}{\beta_{1,3}} DF + \beta_{1,0} \quad (3a)$$

$$r = \underset{1.09^{*}}{\beta_{2,1}} i + \underset{0.47^{*}}{\beta_{2,2}} NPL + \beta_{2,0} \quad (3b)$$

$$NPL = \underset{-4.09^{*}}{\beta_{3,1}} (L - Y) + \underset{1.48^{*}}{\beta_{3,2}} DF + \beta_{3,0} \quad (3c)$$

Model (3a)–(3c) was identified using overidentifying restrictions on the parameters of matrix β; these restrictions are accepted by the model using the likelihood-ratio test.

Relation (3a) can be interpreted as long-run demand for credit, with the level of loans depending on the size of GDP, the interest rate on corporate loans (the cost of external financing) and the default rate. The first two variables (see Calza et al., 2001) are considered to be standard factors influencing credit demand, while a rising default rate can to some extent be thought of as a proxy for the profitability or overall soundness of non-financial corporations' balance sheets. The presence of this variable in relation (3a) can be justified with reference to theoretical models which postulate that adverse changes in corporate balance sheets have a negative effect on total credit demand (see, for example, the discussion of this literature in Balke and Zeng, 2011). This implies that $\beta_{1,1}$ should take positive values, while $\beta_{1,2}$ and $\beta_{1,3}$ should, according to the theory, be negative. The signs of the estimated parameters are in line with the theory, although the GDP parameter seems unusually high. The estimates of this parameter in empirical studies in other countries are generally slightly greater than one, with some studies even working with a homogeneity assumption where $\beta_{1,1}$ is exactly equal to one (loan growth equals GDP growth). The very high parameter value for the Czech Republic can be partially explained by the time period chosen for the estimation. It covers the pre-crisis phase of strong credit expansion, during which credit growth significantly outpaced economic growth (see Chart 1). The low initial debt level may also have affected the parameter value.

Equation (3b) describes the formation of corporate sector funding costs. Economic theory holds that, in the long run, banks generally set their interest rates with reference to the monetary policy rate, from which their financing costs are derived. Omitting the credit risk rate (NPL), relation (3b) shows that each bank sets its interest rate as a constant mark-up on the policy rate, so it can be interpreted as a long-run credit supply equation (see Kok Sørensen et al., 2012). The presence of the $\beta_{2,2}$NPL term in this equation complicates this simple interpretation, but there is some justification for including the NPL ratio in the credit supply equation. Growth in NPLs is closely related[9] to loan loss provisioning, which, in turn, leads to growth in banks' costs and (*ceteris paribus*) deterioration in their capital positions. This puts downward pressure on the total supply of loans. Armed with this reasoning, we will continue to interpret relation (3b) as a long-run credit supply equation. At the same time, it is reasonable to assume that $\beta_{2,1}$ and $\beta_{2,2}$ will be positive, i.e. that interest rates for non-financial corporations will rise in line with banks' funding costs and the credit risk rate. These assumptions are consistent with the estimated parameter values.

The final equation describes the relationship between the two credit risk rates. The (partially) forward-looking default rate explains the movements in the ratio of NPLs to total loans. This relationship is more of a definition and is needed in the model in order to capture the existing long-run relationship. The NPL ratio is also dependent on the difference between the actual level of loans and GDP. Owing to their logarithmic transformation, the difference

7 The Saikkonen-Lűtkepohl test also indicates the existence of three or four cointegrating relationships depending on the period length (starting either in 2002 Q1 or in 2005 Q1), whereas the Bierens non-parametric test suggests that there are only two cointegrating relationships.

8 The estimated values of the relevant parameters are given below the equations. Asterisks indicate statistical significance at the 5% level. The validity of the chosen model was tested using standard tests of normality and (non-)autocorrelation of residuals. These identified no serious violations of the standard assumptions.

9 A simple comparison of the NPL ratio with the ratio of provisions to gross loans reveals a very close correlation between the two series.

between the two variables in (3c) is identical to the loan-to-GDP ratio, which is regarded as an important credit cycle indicator. This form of the equation is achieved by means of suitable restrictions on the original parameters of the model. At a time of credit expansion (contraction), when loans are rising significantly faster (slower) than GDP and market expectations are optimistic (pessimistic), the NPL ratio will tend to fall (rise). Here again, the estimated parameters are consistent with the assumed values.

Finally, we need to investigate the stability of the cointegrating relationships. Using the test proposed by Bierens and Martins (2010) we can test the stability of the parameters of matrix β against the alternative of smooth change over time. The test clearly rejects the hypothesis of stable long-run relationships in favour of time-varying cointegrating vectors. This suggests that model (2) leads to more realistic estimates and provides more refined outputs. For this reason, the results obtained using this model are also partially[10] presented in the following text.

4. IDENTIFICATION OF DEMAND AND SUPPLY PRESSURES

With regard to the aims of our analysis, we are interested primarily in the deviations from equilibrium for the first two cointegrating relationships, which, according to the reasoning above, can be thought of as credit demand and credit supply.

In the case of the credit demand equation (3a), negative deviations indicate that the actual amount of loans is lower than the equilibrium level as determined by structural factors. In such circumstances, the corporate sector exerts upward pressure on loans towards the equilibrium level. Conversely, if the actual amount of loans is higher than the level consistent with economic fundamentals (a positive deviation), there is no fundamental reason for demand pressures to exist. However, positive deviations from equilibrium can also arise if the amount of loans gradually falls in response to a rapid economic downturn. The slower decline in loans than in GDP is due to the greater persistence of this series. To assess the presence of demand pressures, one therefore needs to consider not only the direction of the deviation, but also the current position in the credit cycle and simultaneously the situation on the supply side, as the demand and supply sides interact with each other.

In the case of the credit supply equation (3b), deviations from equilibrium can, with some caution, be interpreted analogously. The case where the actual interest rate is higher than the model-implied rate (a positive deviation) reflects efforts by banks to curb the loan supply by tightening their credit conditions and raising corporate financing costs. On the other hand, a negative deviation, indicating a lower interest rate than that implied by the model, signals that the credit conditions are favourable and banks are more interested in lending. Note that equation (3b) only captures change in the interest rate component of the credit standards and is not able to capture any other forms of tightening or loosening of the credit conditions, which also affect the total supply. However, in crisis periods, which this analysis is primarily concerned with, all available instruments are usually set in the same direction, so the main tendencies should be captured by the model.

Our analysis of the deviations from long-term credit demand and supply (see Chart 2a) indicates that the period from the end of 2005 to mid-2008 can be characterised as a time when growth in loans was driven mainly by demand pressures amid positive economic growth, although the credit conditions also remained relatively relaxed.[11] The onset of the financial crisis and its real impacts on the Czech economy led to sizeable credit restrictions by banks and subsequently also to a fall in demand in line with the fall in GDP during the crisis. Although the credit conditions were eased again relatively quickly, demand for credit did not change significantly. In 2011 we can see a pick-up in bank lending due to roughly neutral credit conditions and temporarily renewed economic growth. By comparison with the previous period, the last two years are characterised by relatively small deviations from equilibrium for both cointegrating relationships and by relatively low credit activity. Given the favourable financing conditions, the modest growth in loans in the most recent quarter is due more to demand pressures, which, however, are very limited.

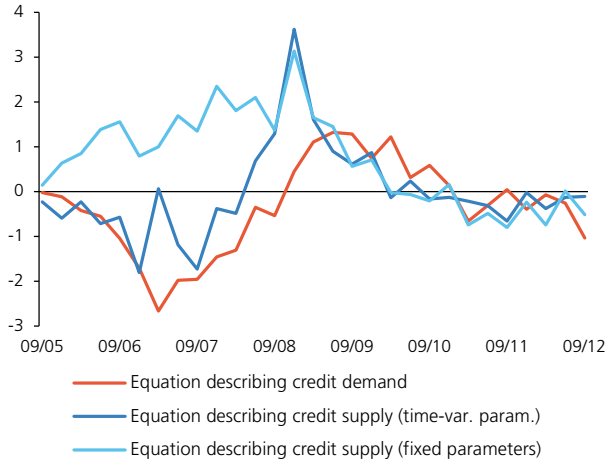
10 We cannot rely entirely on this model, because it does not allow us to impose the (over-)identifying restrictions that lead to the system of equations (3a)–(3c). Strictly speaking, then, model (2) is not entirely analogous to the system we are investigating. Nonetheless, we were able, by mutually evaluating the coefficients, to choose a time-varying cointegrating vector that strongly resembles a credit supply equation.

11 We base our evaluation of the credit conditions on the time-varying parameter model, the choice of which is motivated by the test results and by economically more intuitive findings. We will return to the differences between the static and time-varying parameter models later.

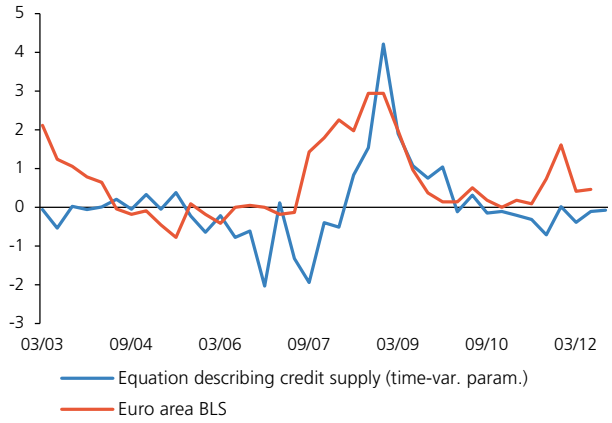
CHART 2

RESULTS OF THE MODEL AND COMPARISON WITH AVAILABLE DATA FOR THE EURO AREA

a) Deviations from long-run relationships



b) Comparison of euro area BLS results with model results



Source: CNB, ECB, authors' calculations
Note: For the purposes of comparison, the series were normalised by the standard deviation.

Looking at the effects of supply and demand factors over time with regard to the magnitude and length of the deviations, we see larger deviations from equilibrium on the demand side. This is in line with the opinion of some earlier studies on the role of demand in credit growth (see Kok Sørensen et al., 2012, p. 6). However, supply shocks and their effect on total loans cannot be ignored, especially in a crisis period. In the initial phase of the crisis (which peaked in the final quarter of 2008) we can see a sizeable deviation from the equilibrium supply relationship, implying significant credit restrictions. The question of how much the excessive supply restrictions throttled subsequent GDP growth is not an easy one to answer, although given their timing one cannot rule out that they played a part in the subsequent contraction. Such a finding would be in line with Woodford (2010), who sees the initial cause of the economic crisis more in obstacles on the supply side than in a change in the behaviour of firms or in the problems of firms.[12]

The description of the evolution of credit demand using the fixed parameter model (1) seems consistent with economic intuition. In the case of supply, by contrast, the tightening of the credit conditions in the pre-crisis period seems too strong. For this reason, when interpreting the supply pressures we concentrated on the output of the model with time-varying cointegrating relationships. The two relationships describing credit supply have been almost identical since 2008, but in the pre-crisis period the static model is unable to fully capture the path of adjustment to equilibrium because of changes in the parameters.

To check the relevance of the results obtained, we can compare our estimated "credit supply" with the results of the euro area BLS. Although the situation is not necessarily uniform across countries, it is reasonable to assume that the main features will be similar given the interconnectedness of markets (including ownership links) and the global nature of the crisis. We can see (in Chart 2b) that the time-varying parameter model reconstructs the survey results surprisingly well. Thus, it can be used in the future to cross check the results of the recently introduced BLS in the Czech Republic.

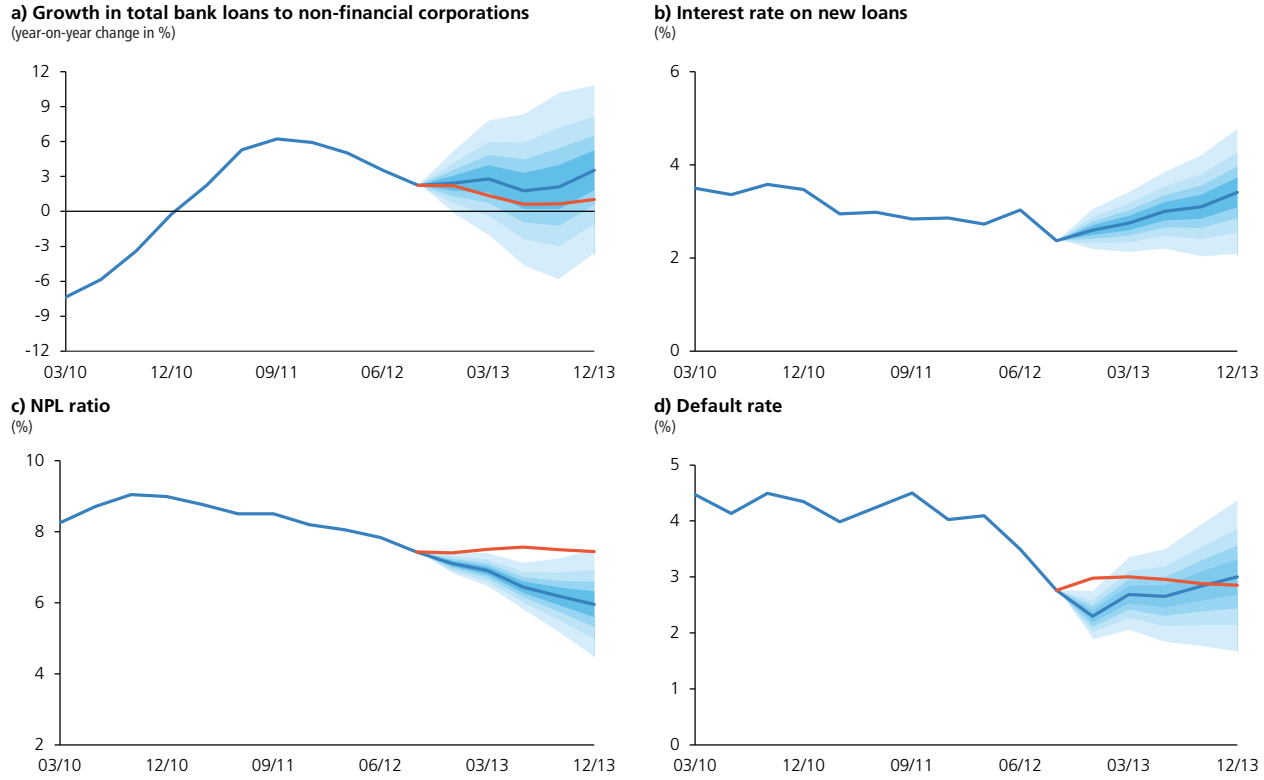
A more detailed comparison of the two indicators (see Chart 2b) reveals that developments in the Czech Republic lagged behind those in the euro area in the pre-crisis period, since the significant easing of credit conditions between 2005 and 2006 took a while to show up in the Czech environment.[13] A time shift can also be observed in the onset of the subsequent tightening, although its peak and the ensuing process of easing were more or less synchronised. This mirrors the economic cycles of the two economies, which were also not fully synchronised in the

12 Concerns about developments in Europe had a strong effect despite the Czech banking sector's different situation (systemic liquidity surplus, high capital adequacy). Links to European parent banks played a role here.

13 The easing seems to have been stronger in the Czech economy, but this may be due solely to the noise present in the data.

CHART 3

FORECASTS OF SELECTED VARIABLES AND COMPARISON WITH THE BASELINE SCENARIO OF THE BANK STRESS TEST



Source: CNB, authors' calculations
Note: The confidence intervals of the forecasts are 30%, 50%, 70% and 90%; the red line represents the outputs of the bank stress test (*Baseline Scenario, December 2012*)

pre-crisis period but became much more correlated after the crisis began.[14]

A significant difference between conditions in the euro area and those in the Czech economy arose again in the first half of 2012, when market tensions increased and credit standards were tightened in the euro area as a result of the problems faced by the southern member states. This blip is also visible in the supply time series for the Czech Republic, although it is far less intense. This can be ascribed to the fact that the temporary tensions were not reflected very strongly in credit conditions in the Czech Republic owing to the low exposure of domestic banks to the problem countries. This conclusion is supported by data from a survey of non-financial corporations indicating no deterioration in access to credit financing in this period.

14 See, for example, the Analyses of the Czech Republic's Economic Alignment with the Euro Area published annually by the CNB.

5. FORECASTS OF SELECTED VARIABLES

VAR and VECM models are widely regarded as suitable tools for constructing forecasts. This means that, in addition to the analyses conducted above, the estimated model can be used for forecasting purposes. Although predictions can be obtained for any of the six variables included in the model, we only focus on those which relate to the corporate sector and which also (with the exception of the interest rate) feature among the outputs of bank stress tests (see Chart 3).

According to the forecasts, credit growth should remain moderate and both credit risk indicators will stay relatively favourable until the end of 2013. The interest rate should remain favourable for firms, although the predictions indicate that interest rates will gradually go up. However, the uncertainty associated with the forecasts is relatively high.

The results can again be compared with other published outputs, in this case the corporate indicators emanating

from the *Baseline Scenario* of the December 2012 banking sector stress test (see Chart 3).[15] Although the two models produce slightly different forecasts of the analysed indicators (note, in particular, the faster decline in the NPL ratio than in the *Baseline Scenario*[16]), the basic tendencies are broadly similar (see Chart 3). This confirms that the tested scenario is plausible and that the calibration of the satellite models (with use of which the corporate indicators in the stress test are estimated employing the CNB's main "g3" macroeconomic model) is realistic.

6. CONCLUSION

In this article we discussed the construction of a simple model to describe the evolution of the determinants of credit growth. The estimated model was used to disentangle demand and supply effects on the amount of loans and to obtain forecasts for the credit characteristics of the corporate sector.

The main contribution is to obtain credit supply side information that was not previously available owing to the short history of the bank lending survey in the Czech Republic. This output finds wide application in a whole range of analyses, including in the area of financial stability. The plausibility of the results is supported by the fact that the estimated deviations from the equilibrium level of the supply relationship correlate very well with the credit conditions obtained on the basis of existing surveys for the euro area.

The results also suggest that in normal circumstances, supply and demand show a high degree of interaction and correlation. Given the general consensus that credit growth is predominantly driven by demand, this can be interpreted as meaning that in normal conditions the credit supply adjusted to demand pressures. By contrast, when the financial crisis erupted the situation was briefly influenced by significant credit restrictions by banks, which to some extent may also have affected the magnitude of the subsequent contraction in GDP. There are currently no major pressures on either the demand side or the supply side and both factors are close to their equilibrium levels.

15 The results of the December 2012 stress test are also based on the data available up to 2012 Q3.

16 In the following year, the NPL ratio in the Baseline Scenario falls to similar levels as the model (1) forecast, although this is not shown in the chart. The difference may also be due to the fact that the credit risk indicators are conservatively calibrated in the stress tests.

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GLOSSARY

Acid-test ratio This indicator of corporate liquidity can be calculated as the ratio of total current assets excluding inventories to total liabilities. In general, the higher this indicator, the stronger the company's liquidity position. See also Cash ratio and Current ratio.

Balance-sheet liquidity The ability of an institution to meet its obligations in a corresponding volume and term structure.

Balance-sheet recession A situation caused by the efforts of market participants to reduce their debt, a resulting drop in demand for loans, and a limited ability to stimulate economic activity through monetary policy. The onset of a balance-sheet recession usually follows a sharp decline in asset prices, when the balance sheets of market participants can record negative equity, i.e. the value of assets is lower than that of balance-sheet liabilities. A typical example is the period following the bursting of the stock and property bubble in Japan during the 1990s.

Bank Lending Survey (BLS) A survey of bank lending conditions for non-financial corporations and households in the Czech Republic, the pilot round of which took place in 2012 Q1. The survey aims to obtain qualitative information on current perceptions of the situation on both the supply and demand side of the credit market.

Basel III A new regulatory framework issued by the Basel Committee on Banking Supervision in 2010 which sets standards for capital adequacy of banks and now also for their liquidity. Overall, Basel III introduces stricter rules than the previous framework and came into existence mainly as a reaction to the financial crisis.

Breakdown of banks by total assets
In some charts and tables in the FSR, banks are assigned to groups based on the amount of their total assets. The breakdown of banks into groups is revised at the end of each calendar year. In 2007 and 2008, banks having total assets of over CZK 150 billion were regarded as large banks, banks having total assets of over CZK 50 billion and up to CZK 150 billion were regarded as medium-sized banks and banks having total assets of less than CZK 50 billion were regarded as small banks. In 2009 the total amount of assets necessary for inclusion in the group of large banks was increased to CZK 200 billion and the range for medium-sized banks was changed to CZK 50 billion–CZK 200 billion. The range for small banks was unchanged. As from 2012, the breakdown of banks by total assets is as follows: large banks have total assets of over CZK 250 billion, medium-sized banks have total assets of over CZK 50 billion and up to CZK 250 billion and small banks have total assets of less than CZK 50 billion.

Capital adequacy ratio The ratio of regulatory capital to total risk-weighted assets. Tier 1 capital adequacy is the ratio of Tier 1 capital to total risk-weighted assets (see also Tier 1).

Cash ratio This indicator of corporate liquidity can be calculated as the ratio of total funds on accounts and in cash to total short-term liabilities. In general, the higher this indicator, the stronger the company's liquidity position. See also Acid-test ratio and Current ratio.

CERTIS A payment system processing all domestic interbank transfers in Czech koruna in real time. Banks, credit unions and foreign bank branches are participants in this system.

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.

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.

Credit default swap (CDS)

A credit derivative in which the buyer of the collateral undertakes to pay the seller periodical fixed payments ("swap premium") for the duration of the contract in exchange for a conditional payment of the counterparty in the case of default of the "reference entity" to which the agreement refers. If default does not occur, the contract terminates at a specified time and the seller only gains a premium for taking on the potential credit risk.

Credit premium

The premium on the return on a portfolio for credit risk.

Current ratio

This indicator of corporate liquidity can be calculated as the ratio of total current assets to total liabilities. In general, the higher this indicator, the stronger the company's liquidity position. See also Acid-test ratio and Cash ratio.

Custody

Banks offer their clients the service of safekeeping and management of securities and settlement of securities transactions on both domestic and foreign markets. The bank opens and maintains a securities owner account for the customer, on which it performs settlement of the customer's capital market trades as instructed by the customer. As the custodian, the bank performs activities directed at preserving the rights attaching to the securities in its custody.

D-SIB capital surcharge (D-SIB capital buffer)

An increase in the regulatory capital requirement for a bank based on its D-SIB value.

D-SIB value

Expresses a bank's relative systemic importance to the domestic economy, i.e. the impacts that distress of this bank would have on the domestic economy by comparison with the impacts of distress of other banks.

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.

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.

Downward liquidity spiral An inverse relationship between market risk and funding liquidity risk. A downward liquidity spiral may be triggered by a single financial institution which has insufficient liquidity and is unable to borrow on the money market. In this case, it might attempt to sell some of its assets. If tensions exist on the market for the given asset, the financial institution may cause the price of the asset to fall rapidly through aggressive attempts to sell (a "loss spiral"). The fall in the asset price affects the balance sheets of all holders of the asset and, owing to a rise in haircuts and margin calls, results in more and more attempts to sell and more and more price declines (a loss of market liquidity, a "margin spiral").

Eligible collateral An asset accepted to ensure fulfilment of an obligation to the central bank.

Equalisation provision The equalisation provision is set aside for individual areas of non-life insurance and is intended to equalise increased insurance claim costs arising due to fluctuations in loss ratios as a result of facts independent of the will of the insurance company.

Euro area effective GDP growth
GDP growth in the 14 euro area countries weighted by Czech exports to those countries.

Financial repression Policies and instruments that allow the government to fund its debt cheaply at the expense of domestic creditors by borrowing from them via banks, insurance companies and pension funds at artificially low interest rates or by imposing an inflation tax on them.

Forbearance A practice where banks, instead of recognising a deterioration in asset quality and reporting a loss, "restructure" the loan, for example by extending the repayments over a longer time horizon, allowing the debtor temporarily to pay interest only, or otherwise changing the lending conditions so that the debtor does not have to acknowledge open default.

G-SIB value Expresses a bank's relative systemic importance to the global economy, i.e. the impacts that distress of this bank would have on the global economy by comparison with the impacts of distress of other globally important banks.

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 index (HI) 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 HI, 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.

Jump-to-default risk The risk of sudden default that arises before the market can reflect that risk in prices.

Liquidity Money in the broader sense (cash, short-term assets quickly exchangeable for cash, etc.).

Loan-to-value (LTV) ratio The ratio of a loan to the value of pledged property.

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 (see also 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.

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.

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.

Monte Carlo simulation A numerical technique based on repeated random sampling. It employs a large number of simulations of a particular random variable to determine its approximate distribution and thus also the most likely value it can take.

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. See also Total population increase.

Net financial assets The difference between the sum of financial assets and the sum of liabilities.

Net international investment position The surplus of financial assets over financial liabilities of residents vis-à-vis non-residents.

Non-performing loans Substandard, doubtful and loss loans. Also called loans in default or default loans.

Overnight segment The money market on which overnight funds are traded.

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 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 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). See also Property transaction prices.

Property developers/developments Companies/projects whose aim is to build a complex of residential and commercial property. Property developers' work includes choosing an appropriate site, setting up a project, obtaining the necessary permits, building the necessary infrastructure, constructing the buildings and selling the property. Developers also often organise purchase financing for clients and frequently lease or manage the property once it is built (especially in the case of commercial property). Given the combination of construction activity and speculative property purchases, developers' results are strongly dependent on movements in property prices.

Property transaction prices Prices of actual transactions on the property market, which should be the closest to actual market prices. The CZSO has been publishing two types of data on property transaction prices since 2011. Prices based on Ministry of Finance statistics from property transfer tax returns and published by the CZSO are the older source. These data contain time series from 1998 and are available in a relatively detailed breakdown (by region, degree of wear and tear and type of property). On the other hand, they do not include transactions which are not subject to property transfer tax (i.e. primarily transactions in new property) and the index is published with a lag of at least half a year. The second, new source of data on property transaction prices is data from CZSO surveys in estate agencies. They cover new property, but are not available in such a long time series and such a detailed breakdown. See also Property asking prices.

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. Japan has applied quantitative easing in the past decade, and the US Fed, for example, is to some extent pursuing a similar policy at present.

Recovery rate The percentage of the amount of a non-performing loan recovered by a creditor, e.g. by foreclosure.

Rental return The ratio of the annual supply rent to the asking price of the apartment. It is the inverse of the price-to-rent ratio.

Return on assets The profit of a company expressed as a percentage of its total assets.

Return on equity The profit of a company expressed as a percentage of its equity capital.

Risk premium The risk premium an investor demands on investments in riskier financial instruments.

RTGS Real-time gross settlement, i.e. each transaction is processed and settled on-line in real time. The CERTIS payment system operates on this principle.

Secondary market The market on which existing securities are traded.

SKD Short-Term Bond System. The system is used for issuing and registering all book-entry securities with maturities of up to one year and for settling trades in these securities. At present, T-bills and CNB bills are registered in SKD. The system enables sales of securities, repos and sell and buy operations, as well as pledges and exchanges of securities.

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.

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.

Technical provisions Under the Act on Insurance, an insurer must set aside technical provisions to meet insurance obligations which are either likely to be incurred or certain to be incurred but uncertain as to amount or as to the date on which they will arise.

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.

Too big to fail A financial institution is "too big to fail" if the markets and the public believe it is so important to the economy that the state will spare no effort or expense to rescue it (stop it going bankrupt) if it gets into distress.

Value-at-risk The size of loss, with predefined probability, which a bank may suffer when holding a current portfolio for a certain period if market factors (e.g. interest rates, exchange rates) develop unfavourably.

Yield spread Also yield differential; the spread between the yield on a bond and the yield on a reference ("benchmark") bond.

ABBREVIATIONS

AEX	Amsterdam Exchange index
AFS	available-for-sale (financial assets in the "available for sale" accounting category)
ARAD	database of aggregated time series administered by the CNB
ASM	available solvency margin
ASW	asset-swap spread (difference between the swap yield curve and the government bond yield curve)
ATM	automated teller machine
BCBS	Basel Committee on Banking Supervision
BdF	Banque de France
bp	basis point
BIS	Bank for International Settlements
BLS	Bank Lending Survey
BMA	Bayesian model averaging
BRCI	Bank Register of Client Information operated by Czech Banking Credit Bureau
BRIC	Brazil, Russia, India and China
CAC 40	benchmark French stock market index
CAR	capital adequacy ratio
CB	central bank
CCA	contingent claims analysis
CCMA	Czech Capital Market Association
CCR	Central Credit Register
CDS	credit default swap
CEE	Central and Eastern Europe
CERTIS	Czech Express Real Time Interbank Gross Settlement System
CESR	Committee of European Securities Regulators
CET1	Common equity Tier 1
CGFS	Committee on the Global Financial System
CIFs	collective investment funds
CIS	Commonwealth of Independent States
CLFA	Czech Leasing and Finance Association
CNB	Czech National Bank
COSMC	Czech Office for Surveying, Mapping and Cadastre
CoVaR	conditional value-at-risk
CRB	Commodity Research Bureau Index (Reuters commodity index)
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CTU	Czech Technical University
CZ	Czech Republic
CZEONIA	Czech OverNight Index Average (reference O/N interest rate on the interbank market)
CZK	Czech koruna
CZSO	Czech Statistical Office
DAX	Deutscher Aktien IndeX
DB	Deutsche Bank
DD	distance to default
DJStoxx50	Dow Jones EURO STOXX 50, the main European stock index, comprising 50 corporations
DJ UBS	Dow Jones commodity index
D-SIB	domestic SIB
D-SIFI	domestic SIFI
EA	euro area
EAD	exposure at default
EBA	European Banking Authority

EBIT	earnings before interest and taxes
EBITDA	earnings before interest, taxes, depreciation and amortization
EC	European Commission
ECB	European Central Bank
ECM	error correction model
EDP	Excessive Deficit Procedure
EEA	European Economic Area
EFFAS	European Federation of Financial Analysts Societies
EFSF	European Financial Stabilisation Facility
EFSM	European Financial Stabilisation Mechanism
EIB	European Investment Bank
EIOPA	European Insurance and Occupational Pensions Authority
EMBI	Emerging Market Bond Index
EMU	European Monetary Union
EONIA	Euro OverNight Index Average (reference O/N interest rate on the interbank market)
ESA 95	European System of Accounts
ESCB	European System of Central Banks
ESFS	European System of Financial Supervisors
ESM	European Stability Mechanism
ESMA	European Securities and Market Authority
ESRB	European Systemic Risk Board
EU	European Union
EU-12	euro area as of 2001–2006
EUR	euro
EURIBOR	Euro InterBank Offered Rate (reference interest rate on the interbank market)
EWMA	exponentially weighted moving average
EWS	early warning system
FASB	Financial Accounting Standards Board
FDI	foreign direct investment
Fed	Federal Reserve System
FRA	forward rate agreement
FSAP	Financial Sector Assessment Program
FSB	Financial Stability Board
FSR	Financial Stability Report
FSSA	Financial Sector Stability Assessment
FTSE 100	Financial Times Stock Exchange Index
GARCH	generalised autoregressive conditional heteroscedasticity
GBP	pound sterling
GDI	gross disposable income
GDP	gross domestic product
GMM	generalized method of moments
GSCI	Goldman Sachs Commodity Index (S&P commodity index)
G-SIB	global SIB
G-SIFI	global SIFI
G-SII	global systemically important institutions
HB index	Hypoteční banka property price index
HBS	Household Budget Statistics
HP	Hodrick-Prescott filter
HTM	held-to-maturity
HUF	Hungarian forint
IASB	International Accounting Standards Board
IBEX	Iberia Index (benchmark stock market index – Spain)

IBRD	International Bank for Reconstruction and Development
IF	investment firm
IFRS	International Financial Reporting Standards
ILO	International Labour Organisation
IMF	International Monetary Fund
IMF IFS	IMF International Financial Statistics
IP	investment position
IRB	Internal Rating Based Approach, a Basel II bank capital adequacy approach
IRI	Institute for Regional Information
IRS	interest rate swap
JPY	Japanese yen
LB	liquidity buffer
LCR	liquidity coverage ratio
LFS	Labour Force Survey
LGD	loss given default
LIBOR	London InterBank Offered Rate (reference interest rate on the interbank market)
LOLR	lender of last resort
LTD	loan-to-deposit
LTI	loan-to-income
LTRO	Longer-Term Refinancing Operation
LTV	loan-to-value
MA	monthly adjusted
MaRs	Macroprudential Research Network – a macroprudential research group within the ESCB
MCR	minimum capital requirement – the minimum required capital for calculation of the solvency of insurance companies and reinsurers
MF CR	Ministry of Finance of the Czech Republic
MFI	monetary financial institution
MiFID	Markets in Financial Instruments Directive
MLCX	Merrill Lynch Commodity Index
MLSA	Ministry of Labour and Social Affairs
MNB	Magyar Nemzeti Bank (the Hungarian central bank)
NACE	General Industrial Classification of Economic Activities
NFCEL	non-bank financial corporation engaged in lending
Nikkei	stock market index (Tokyo)
NPL	non-performing loan
NRCI	Non-bank Register of Client Information operated by Czech Non-Banking Credit Bureau
NSFR	net stable funding ratio
O/N	overnight
OECD	Organisation for Economic Cooperation and Development
OeNB	Österreichische Nationalbank (the Austrian central bank)
OFIs	other financial intermediaries
OIS	overnight indexed swap
OLS	ordinary least squares
OMF	open-end mutual fund
OMT	Outright Monetary Transaction
OMX	stock market index for the Stockholm Stock Exchange
OOS	out-of-sample method
OR	operational risk
OSII	other systemically important institution
OTC	over-the-counter (outside regulated markets)
p.a.	per annum
pp	percentage point

PBTDA	profit before taxes, depreciation and amortization
PD	probability of default
P/E	price-to-earnings ratio
PIIGS	Portugal, Italy, Ireland, Greece and Spain
PLN	Polish zloty
PMG	Pooled Mean Group
PRIBOR	Prague InterBank Offered Rate (reference interest rate on the interbank market)
PSM	propensity score matching
PX	Czech stock market index
QA	quick assets
QE	quantitative easing
QFA	quarterly financial accounts
QIS	quantitative impact study
RCG	regulated consolidated group
RGDI	real gross domestic income
RMBS	residential mortgage-backed securities
RMSE	root mean square error
RoA	return on assets
RoE	return on equity
RoS	return on sales
ROW	rest of the world
RTGS	real time gross settlement
RWA	risk weighted assets
SA	seasonally adjusted
S&P500	Standard & Poor's 500, a US stock index comprising 500 corporations
SCR	solvency capital requirement – the minimum solvency requirement for risks undertaken by insurance companies and reinsurers
SCS	systemic capital surcharges – additional capital requirements against systemic risk
SEK	Swedish krona
SIB	systemically important bank
SIFI	systemically important financial institution
SILC	Statistics on Income and Living Conditions
SKD	Short-Term Bond System
SKK	Slovak koruna
SMEs	small and medium-sized enterprises
SOLUS	association of legal entities – register of debtors
TBTF	too big to fail
USA	United States of America
USD	US dollar
VA	value added
VaR	value-at-risk
VAT	value added tax

COUNTRY ABBREVIATIONS

AT	Austria	IS	Iceland
AU	Australia	IT	Italy
BE	Belgium	JP	Japan
BG	Bulgaria	KO	Korea
BR	Brazil	LT	Lithuania
CA	Canada	LU	Luxembourg
CN	China	LV	Latvia
CY	Cyprus	ME	Mexico
CZ	Czech Republic	MT	Malta
DE	Germany	NL	Netherlands
DK	Denmark	NO	Norway
EE	Estonia	NZ	New Zealand
ES	Spain	PL	Poland
FI	Finland	PT	Portugal
FR	France	RO	Romania
GR	Greece	RU	Russia
HR	Croatia	SE	Sweden
HU	Hungary	SI	Slovenia
CH	Switzerland	SK	Slovakia
IE	Ireland	UK	United Kingdom
IN	India	US	United States

FINANCIAL STABILITY INDICATORS – PART 1

		2007	2008	2009	2010	2011	2012	2013 Jan.	2013 Feb.	2013 Mar.	2013 Apr.
Macroeconomic environment											
MP.1	Real GDP growth (year on year, %)	5.7	2.9	-4.4	2.3	1.8	-1.2				
ME.2	Consumer price inflation (average annual index growth, %)	2.8	6.4	1.0	1.5	1.9	3.3	3.2	3.0	2.8	2.7
ME.3	Public finance deficit/surplus/GDP (%)	-0.7	-2.2	-5.8	-4.8	-3.2	-4.4				
ME.4	Public debt/GDP (%)	27.9	28.7	34.2	37.8	40.8	45.8				
ME.5	Trade balance/GDP (%)	1.3	0.7	2.3	1.4	2.4	3.8				
ME.6	External debt in % of banking sector external assets	129.0	134.4	135.4	137.7	146.9	141.9				
ME.7	Balance of payments current account/GDP (%)	-4.3	-2.1	-2.4	-3.9	-2.7	-2.4				
ME.8	Monetary policy 2W repo rate (end of period, %)	3.50	2.25	1.00	0.75	0.75	0.05	0.05	0.05	0.05	0.05
Non-financial corporations											
NC.1	Return on equity (%)	11.2	9.4	8.0	9.0	9.0	8.4				
NC.2	Debt (% of total liabilities)	45.7	47.3	47.5	47.6	49.9	50.5				
NC.3	Credit indebtedness (% of GDP)	37.8	40.7	39.1	38.6	39.4	39.7				
NC.4	– loans from Czech banks (% of GDP)	19.8	21.6	20.8	20.6	21.5	21.9				
NC.5	– loans from Czech non-bank financial corporations (% of GDP)	4.7	5.0	4.5	4.8	5.0	6.3				
NC.6	– other (including financing from abroad, % of GDP)	13.2	14.1	13.7	13.2	12.8	11.5				
NC.7	Interest coverage (pre-tax profit+interest paid/interest paid, %)	12.6	11.4	10.3	12.4	12.5	12.7				
NC.8	12M default rate (%)	1.5	2.9	4.0	4.3	3.1	1.9				
Households (including sole traders)											
H.1	Debt/gross disposable income (%)	45.9	50.0	51.4	53.5	56.9	58.6				
H.2	Debt/financial assets (%)	28.2	30.9	31.4	31.4	31.3	30.6				
H.3	Net financial assets (total financial assets – total liabilities, % of GDP)	57.8	55.7	59.6	61.5	65.0	69.8				
H.4	Debt/GDP (%)	23.7	26.3	28.7	29.7	31.3	32.5				
H.5	– loans from Czech banks to households (% of GDP)	18.3	21.0	23.9	25.3	26.4	27.3				
H.6	– loans from Czech non-bank financial corporations to households	3.5	3.6	3.0	1.7	1.8	1.8				
H.7	– loans from Czech banks to sole traders (% of GDP)	1.1	1.1	1.1	1.1	1.0	0.9				
H.8	– loans from Czech non-bank financial corporations to sole traders (%	1.0	0.8	0.7	0.7	0.6	0.5				
H.9	– other (including financing from abroad, % of GDP)	-0.2	-0.2	0.1	0.9	1.5	2.0				
H.10	Interest expenses/gross disposable income (%)	0.9	1.2	1.6	2.0	2.0	2.0				
H.11	12M default rate (%, excluding sole traders)	...	3.3	4.8	4.8	4.1	4.0				
Financial markets											
FM.1	3M PRIBOR (average for period, %)	3.0	4.0	2.2	1.3	1.2	1.0	0.5	0.5	0.5	0.5
FM.2	1Y PRIBOR (average for period, %)	3.4	4.2	2.6	1.9	1.8	1.5	0.9	0.8	0.8	0.8
FM.3	10Y government bond yield (average for period, %)	4.7	4.1	3.7	3.8	3.4	2.3	1.4	1.5	1.4	1.2
FM.4	CZK/EUR exchange rate (average for period)	27.8	25.0	26.4	25.3	24.6	25.1	25.6	25.5	25.7	25.8
FM.5	Change in PX stock index (% year on year, end of period)	14.2	-52.7	30.2	9.6	-25.6	14.0	5.2	0.3	-1.1	3.1
Property market											
PM.1	Total change in residential property prices (transaction prices, % year on year)	18.5	9.2	-8.0	-0.1	-0.4	-2.5*				
PM.2	Change in apartment prices (asking prices according to CZSO, % year	23.2	19.6	-8.8	-3.0	-5.2	2.5			1.1	
PM.3	Number of property market transactions (houses and apartments, COSMC entries, % year on year)	1.8	11.9	-9.0	-3.8	-23.9	-10.9				
PM.4	Apartment price/average annual wage	5.1	5.2	4.2	4.1	4.0	3.8				
PM.5	Apartment price / annual rent (according to IRI)	22.9	23.8	22.9	21.9	21.7	21.3			20.8	

* Estimate for 2012 H1; only for family houses and apartments (around 74.4% of index).
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

		2007	2008	2009	2010	2011	2012	2013 Jan.	2013 Feb.	2013 Mar.	2013 Apr.
Financial sector											
FS.1	Financial sector assets/GDP (%)	133.8	136.0	141.1	142.5	149.2	156.2				
FS.2	Shares of individual segments in financial sector assets (%)										
FS.3	banks	76.5	77.3	77.2	77.4	78.1	77.2				
FS.4	credit unions	0.2	0.2	0.3	0.4	0.5	0.7				
FS.5	insurance companies	7.0	7.1	7.5	7.9	7.6	7.8				
FS.6	pension funds	3.4	3.7	4.1	4.3	4.3	4.6				
FS.7	collective investment funds	3.9	2.8	2.8	3.1	2.9	3.6				
FS.8	non-bank financial corporations engaged in lending	8.4	8.6	7.6	6.5	6.2	5.8				
FS.9	investment firms	0.5	0.4	0.5	0.5	0.4	0.4				
Banking sector											
BS.1	Bank assets/GDP (%)	102.4	105.1	108.9	110.2	116.5	120.6				
BS.2	Assets structure (%, end of period)										
BS.3	loans to central bank	8.2	7.7	9.4	9.4	8.7	8.3				
BS.4	interbank loans	12.4	10.3	10.5	11.3	10.4	10.0				
BS.5	client loans	48.4	50.8	50.3	50.6	50.5	50.0				
BS.6	bond holdings	22.6	20.0	21.2	21.1	21.9	24.0				
BS.7	– government bonds	12.8	12.5	14.1	14.9	16.3	18.2				
BS.8	– Czech government bonds	11.0	11.0	12.8	13.8	15.1	16.8				
BS.9	other	8.4	11.2	8.7	7.5	8.4	7.7				
BS.10	Liabilities structure (%, end of period)										
BS.11	liabilities to central bank	0.0	0.9	0.1	0.0	0.1	0.2				
BS.12	interbank deposits	11.6	10.6	10.4	10.7	11.2	8.9				
BS.13	client deposits	65.6	64.2	66.6	67.3	65.9	68.3				
BS.14	bonds issued	9.4	9.0	8.8	8.4	8.4	8.0				
BS.15	other	13.4	15.2	14.1	13.5	14.4	14.5				
BS.16	Client loans/client deposits (%)	75.2	80.9	77.8	78.0	79.4	75.8				
BS.17	Sectoral breakdown of total loans (%)										
BS.18	non-financial corporations	41.7	40.9	37.2	35.9	35.9	35.4	35.6	35.5	35.5	
BS.19	households	37.5	38.9	42.7	44.2	43.8	44.3	43.8	43.5	43.4	
BS.20	sole traders	2.2	2.1	2.0	1.9	1.7	1.5	1.5	1.5	1.5	
BS.21	others (including non-residents)	18.7	18.1	18.0	18.1	18.6	18.8	19.1	19.6	19.7	
BS.22	Growth in loans (%, end of period, year on year):										
BS.23	total	26.4	16.4	1.3	3.5	6.0	2.4	3.7	4.0	4.6	
BS.24	non-financial corporations	17.2	14.1	-7.8	-0.3	6.1	0.9	2.0	2.1	2.6	
BS.25	– real estate activity (NACE L)	41.1	25.5	-5.9	6.0	11.5	0.7	4.8	5.2	5.7	
BS.26	households	35.1	20.9	11.1	7.0	5.0	3.6	3.4	3.3	3.4	
BS.27	– loans for house purchase	37.6	20.1	11.5	6.4	6.1	4.8	4.7	4.7	4.7	
BS.28	– consumer credit	26.1	22.8	9.8	7.3	-1.6	-0.7	-1.2	-1.9	-1.3	
BS.29	sole traders	8.7	10.4	-1.4	-5.4	-5.5	-5.0	-5.3	-5.6	-5.8	
BS.30	Non-performing loans/total loans (%):										
BS.31	total	2.6	3.2	5.2	6.2	6.0	6.0	5.9	5.9	6.0	
BS.32	non-financial corporations	3.1	4.2	7.9	9.0	8.2	7.4	7.4	7.4	7.4	
BS.33	households	2.7	2.7	3.8	5.0	4.9	5.1	5.1	5.1	5.2	
BS.34	– loans for house purchase	1.5	1.6	2.5	3.2	3.2	3.4	3.3	3.4	3.5	
BS.35	– consumer credit	7.4	6.7	8.4	11.7	11.3	12.3	12.2	12.2	12.4	
BS.36	sole traders	7.2	8.2	10.8	12.4	12.4	13.7	13.8	14.2	14.3	
BS.37	Coverage of non-performing loans by provisions (%)	60.0	58.1	50.1	46.8	49.0	49.4	49.2	49.1	49.2	
BS.38	Aggregate LTV for housing mortgages	44.7	43.3	56,4*	56.3	57.0	57.2				
BS.39	Capital adequacy (%)	11.5	12.3	14.1	15.5	15.3	16.4	16.5	16.5	16.4	
BS.40	Tier 1 capital adequacy (%)	10.3	11.7	12.7	14.1	14.2	15.9	16.1	16.0	16.0	
BS.41	Leverage (leverage ratio, assets as a multiple of equity)	13.5	12.0	11.4	10.9	11.1	9.9	10.0	10.0	10.0	
BS.42	Return on assets (%)	1.3	1.2	1.5	1.3	1.2	1.4	2.0	1.4	1.2	
BS.43	Return on Tier 1 (%)	24.4	21.7	25.8	21.9	19.3	21.4	29.5	21.7	18.4	
BS.44	Quick assets/total assets (%)	24.0	23.1	25.3	26.1	26.9	29.1	30.5	30.4	29.9	
BS.45	Quick assets/client deposits (%)	36.6	35.9	38.0	38.8	40.8	42.5	44.4	44.3	43.8	
BS.46	Net open position in foreign exchange/capital (%)	0.0	0.1	0.2	1.3	0.3	0.2	0.2	0.3	0.3	
BS.47	Net external position of banking sector (% of GDP)	9.2	7.0	6.2	5.7	4.9	7.6				
BS.48	Banking sector external debt/banking sector total assets (%)	15.1	15.2	12.0	12.2	12.3	10.3	10.2	9.8	10.3	

* 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

		2007	2008	2009	2010	2011	2012	2013 Jan.	Feb.	Mar.	Apr.
Non-bank financial corporations											
NI.1	Share in financial sector assets (%)	22.8	22.1	22.0	21.8	21.1	21.8				
	Insurance companies*										
NI.2	Premiums written/GDP (%)	3.4	3.4	3.6	3.9	3.8	3.8				
NI.3	Solvency of insurance companies: life insurance (%)	284	248	295	354	302					
NI.4	Solvency of insurance companies: non-life insurance (%)	386	459	449	353	331					
NI.5	Change in financial investment of insurance companies (%)	5.0	7.0	6.1	3.5	1.6	5.1				
NI.6	Return on equity of insurance companies (%)	27.4	18.5	26.9	34.1	13.0	17.8				
NI.7	Claim settlement costs/net technical provisions (life, %)	13.0	15.3	15.4	15.2	16.8	17.4				
NI.8	Claim settlement costs/net technical provisions (non-life, %)	60.6	59.3	62.1	68.4	61.4	58.1				
	Pension funds										
NI.9	Change in assets managed by pension funds (%)	14.6	14.7	12.6	7.7	6.5	10.4				
NI.10	Nominal change in value of assets of pension funds†	-3.3	0.3	4.5	-0.8	-0.6	5.3				
	Collective investment funds										
NI.11	Growth in net assets (= equity; year on year, %)	…	…	-0.6	13.1	-2.4	21.1				
	Non-bank financial corporations engaged in lending										
NI.12	Growth in loans from non-bank financial corporations engaged in lending (%):										
NI.13	total	20.8	8.4	-17.1	-8.6	1.5	-3.6				
NI.14	households	29.8	3.5	-18.8	-8.9	3.9	-4.9				
NI.15	non-financial corporations	14.7	12.8	-15.5	-6.7	0.5	-3.1				

* The indicators cover domestic insurance companies only.
† Change in the assets of pension funds adjusted for contributions and benefits.
Note: Owing to data revisions, some historical values of the indicators may not be comparable to those published in previous FSRs.

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