FINANCIAL STABILITY REPORT

2005

CNB CZECH NATIONAL BANK

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SUMMARY

The position of the financial sector strengthened last year, aided by the growth of the domestic economy. The environment of strong growth, which is favourable for both corporate and household balance sheets, can be expected to persist in the coming quarters. Both the real economy and the financial sector are becoming increasingly interconnected with the external environment. This is generating many positive factors, but also certain risks. The domestic financial market is greatly affected by developments on global and regional markets. The economy is profiting from foreign investors' interest. Restructuring of the corporate and financial sectors has led to greater efficiency and is generating better economic performance and a lower external imbalance. On the other hand, substantial amounts of earnings are being repatriated abroad, thus contributing to the current account deficit. The activities of foreign businesses are increasing the competition among financial services providers yet are creating challenges for effective supervision of the financial sector. Financial stability is, of course, also affected by domestic developments. The acceleration in lending in a phase of economic recovery may lead to higher future risks, which could materialise particularly in the event of an economic downturn. When making their decisions, financial institutions should take due account of such factors.

Global economic growth continued, despite the high oil prices

The world economy continued growing in 2005. The rate of recovery in the major economic regions (the USA and the EU) slowed slightly. Although prices in real terms were close to the levels in the period of the second oil shock, the major world economies showed great resilience to such developments. The Central European economies continued to grow much faster than Western European countries.

From the financial stability point of view, the outlook for the external environment remains favourable …

The growth of the US economy is expected to slacken slightly in response to a downswing in household consumption, but growth in Germany and the euro area as a whole is expected to record a modest pick-up, driven by investment and industrial activity. This should create favourable conditions for Czech exports and economic growth.

…but there are, of course, some risks as well

The world economy is exposed to some factors which may affect medium-term economic growth and the stability of international financial markets. One of these issues is the widening of the current account deficit in the USA, driven by household and general government indebtedness. The deficit has so far been financed by inflows of foreign capital. Moreover, the gradual tightening of US monetary policy may depress the rate of growth of household debt and help reduce the current account deficit. A marked dollar depreciation may affect international capital flows and economic growth. A sizeable increase in yields in advanced economies could worsen market sentiment regarding developing economies and cause an outflow of capital from these regions. Also a further potential rise in oil prices could threaten global economic growth. Some of these risks motivated the preparation of the alternative macroeconomic scenarios used in the stress tests.

Domestic macroeconomic developments in 2005 were favourable

In 2005, economic growth in the Czech Republic picked up quite sharply and inflation remained low. A trade surplus considerably reduced the current account deficit. The favourable trend on the supply side of the economy continued, reflected in higher growth in the non-accelerating inflation rate of output. Despite remaining a challenge in the longer term, public finances recorded a lower-than-planned deficit in 2005, thanks mainly to the higher-than-expected economic growth.

The baseline macroeconomic forecast suggests no risks to financial stability…

The CNB's macroeconomic forecast of April 2006 expects the economy to fluctuate around a zero output gap and foresees a modest pick-up in inflation associated with changes to regulated prices and indirect taxes. Consistent with the forecast is interest rate stability initially and a gradual rise in rates thereafter. The baseline scenario does not pose any immediate risks with regard to financial stability.

…but less favourable macroeconomic scenarios are also analysed

The Report analyses three alternative economic scenarios describing potential adverse developments in the external and domestic economic environments. At first we analyse a scenario which assumes a pronounced rise in interest on the major world currencies, resulting in weaker global economic growth and a decline in demand for Czech exports. We also examine a scenario that assumes an appreciation of the koruna combined with a supply shock leading to higher inflation. The final scenario involves a decline in domestic demand. The scenarios model the impact of these developments on the domestic economic environment and on the quality of the loan portfolio. This is followed by an analysis of the effect of these macroeconomic scenarios on the banking sector's stability using stress tests.

The domestic financial market is highly interconnected with international financial markets

Global financial markets reflected the monetary policy tightenings in the USA and partly also in the euro area. Long-term yields on ten-year government bonds in the USA and the euro area, however, did not follow the rise in short-term rates and the yield curves thus flattened. In 2005, Czech nominal ten-year government bond yields reached their lowest level since 2001. Share prices continued rising, pushed up chiefly by demand from foreign investors. Prices of financial assets on Czech markets depend to a large extent on global sentiment or move in line with developments in other Central European economies. The high correlation of movements in the exchange rates of the koruna and other Central European currencies against the euro has declined in recent quarters. The widening negative interest rate differential of the koruna vis-à-vis the euro is stimulating the use of the Czech koruna as a cheap financing currency for investment in other currencies. Any turbulence on global or regional markets poses a potential risk to the Czech financial market and financial stability.

The corporate sector's results remain very good

The economic growth had a positive effect on the turnover ratios of the corporate sector. However, the profitability of large firms was slightly lower than in the extraordinarily successful year 2004. The financial indicators of the corporate sector are to some extent sensitive to oil price movements and the speed of appreciation of the exchange rate. Adverse changes in these factors can affect the quality of loans to corporations. The increasing concentration of production into some industries may increase the sensitivity of economic results to any problems in individual large firms. The rise in lending to the corporate sector in 2005 was driven by SMEs, while the debt of large enterprises decreased. The increasing availability of funds for SMEs is a positive phenomenon. On the other hand, these loans are associated with higher credit risk. The Report presents model estimates of the credit risk of bank loans in response to the evolution of key macroeconomic indicators.

Household debt continued growing

The low interest rates, economic growth, higher employment and rising disposable incomes created favourable conditions for household indebtedness. The rise in households' debt is, however, still lower than the growth in their financial assets. Despite the low interest rates, the rising household debt is starting to feed through to an increasing share of interest expenses in their disposable income. In recent years, household disposable income growth has been relatively slow. Some households may thus have problems repaying their loans.

The debt is concentrated primarily in high-income groups of households

A new analysis of the family budget statistics suggests that in past years the debt has been concentrated predominantly in high-income households. Nonetheless, the indebtedness of low-income households is starting to rise as well. Relatively high loan repayments are negatively affecting the ability of some households to finance other expenditure and generate new savings. Credit risk may also be increased in these households by the higher dependence of their disposable incomes on social transfers. The number of executions – a fast and relatively efficient way of enforcing smaller household debts – continues rising. The possibilities for debt enforcement

will improve thanks to changes in insolvency law, which are discussed in a thematic article. This underlines the need for a prudential approach by both households and banks to the issue of borrowing and related risk management.

The significance of the real estate market is increasing as mortgages continue rising

Mortgages account for two-thirds of loans to households. The available data suggest a stagnation or only modest rise in prices of various types of real estate since 2003. This may be connected with the increasing supply of new housing construction. Against this background, real estate prices are showing a gradual regional convergence. An analysis of the implicit return on rent does not signal the existence of a bubble on the real estate market. The situation on the real estate market is complicated by the persisting price differences between regulated and market rents.

The banking sector increased its lending to the private sector

The growth in loans provided by banks to the private sector picked up in 2005 in line with the favourable developments in the macroeconomic environment. The growth was driven mainly by loans to households, but loans to corporations went up as well. The trend of improving loan quality continued. The share of non-performing loans in total non-bank client credit stood at 4.1% at the end of 2005. The Report analyses the banking sector's sensitivity to various risks (credit risk, interest rate risk, foreign exchange risk and interbank contagion risk). Banks are also exposed to other risks – for instance operational risk. Given the share of loans in the asset structure, credit risk is the most significant risk for the banking sector.

The banking sector remains profitable

The banking sector was highly profitable for the fourth year in a row in 2005. Banks created a net profit of CZK 39.4 billion, a year-on-year increase of 20%. Profit creation is an important factor affecting the financial stability of the system, since it allows the formation of a cushion for risk coverage. However, sufficient profit must be kept in bank's balance sheets. Almost 60% of the net profit created in 2004 remained in banks' balance sheets. Dividends paid totalled CZK 13.6 billion, i.e. 41.5% of the net profit of the banking sector. The decision on the method for the distribution of profit for 2005 has not yet been made. Owing to the prevailing foreign ownership, most of the dividends were transferred abroad. This contributed to the current account deficit. The profitable banking sector suggests improved efficiency and cost management. In the thematic article part of the Report we analyse whether and to what extent the cost efficiency of banks can be used as an early warning signal of bank problems.

The capital adequacy of banks fell slightly

Capital adequacy fell slightly from 12.6% to 11.9%, mainly because of higher capital requirements resulting from the dynamic growth in lending. A model analysis examined banks' sensitivity to credit, exchange rate and interest rate risks. The stress tests were, moreover, extended to include an analysis of interbank contagion risk and an analysis of the impacts of alternative macroeconomic scenarios using a macroeconomic credit risk model. The banking sector as a whole fared well in these tests, with a capital ratio of above 8%. As the new capital accord (Basel II) will probably lead to a decline in the overall capital adequacy of banks in the Czech Republic, sufficient capital formation is becoming a new challenge for banks in the conditions of rapidly growing lending.

The structure of the financial sector remains virtually unchanged

The development of non-banking financial institutions, reflecting above all households' efforts to diversify their assets, continued. However, the banking sector maintained its dominant position in 2005, holding about three-quarters of the total assets of the financial sector. The proportion of banks in the financial sector is approaching the euro area average. The depth of financial intermediation (as measured by the ratio of financial sector assets to GDP) is lower in the Czech

Republic than in the euro area. In the context of the Central European region, however, the ratio for the Czech Republic is high. The range of services offered by insurance companies, pension funds, domestic and foreign collective investment funds and other non-banking financial institutions is gradually expanding. Insurance companies met the solvency criteria and, like pension funds, are compliant with the limits of safe asset allocation. Investment firms also met the capital adequacy criterion.

The internationalisation of the financial sector poses a challenge for cross-border supervisory co-operation

Financial services providers form and operate consolidated groups headed by large banks and insurance companies. The ownership structures of domestic financial institutions are strongly linked with partners from other EU countries. Foreign ownership is having positive effects in terms of higher profitability, better risk management and a wider range of products, services and distribution channels. This is yielding substantial benefits for customers in the Czech Republic. At the same time, foreign ownership is also bringing new potential risks. In particular, it can create new channels of transmission of foreign shocks. The closer integration of the Czech financial sector into the international environment is also associated with the process of creation of the single European financial services market. A number of financial entities are operating under the single European licence system. Hundreds of other banks, insurance companies and investment firms have made notifications and can offer their services in the Czech Republic under the principle of free cross-border provision of services. Banks from outside Europe are also considering establishing branches in the Czech Republic. The growing internationalisation of the financial market is therefore increasing the significance of co-operation with the home supervisors of foreign financial institutions.

Financial stability was supported by smooth functioning payment and settlement systems

A prerequisite for effective and smooth functioning of the entire financial sector is the existence of sound payment and settlement systems. For this reason, supervision of the interbank payment system CERTIS and the short-term bond system SKD is one of the main tasks of the CNB. Both systems are operated by the CNB and process transactions worth hundreds of billions of korunas each day. The CERTIS in particular is recording a rising number and volume of transactions without any threat to the smooth functioning of the system. A major change to the SKD system was the creation of the function of custodian. Custodians maintain customer accounts within the legally permitted two-tier registration of securities.

PART I

1 INTRODUCTION

The Czech National Bank is pleased to present to the public its Financial Stability Report for 2005. In so doing it is fulfilling its new task stipulated by law – to analyse the financial system and contribute to the stability of the financial system as a whole.

An important change ensuing from an amendment to the Act on the CNB (effective from 1 April 2006) is the integration of financial market supervision into the CNB. The integration was aimed at improving the efficiency of supervision and simplifying communication between regulated entities and supervisors. The Financial Stability Report does not deal with this topic in detail, since it focuses on the developments in 2005. The integration should help to further strengthen financial stability in the Czech economy in the medium term.

Financial stability can be understood as a situation where the financial sector operates with no serious failures or undesirable impacts on the present and future development of the economy as a whole, yet shows a high degree of resilience to shocks. Factors, which may (but will not necessarily) have a substantial effect on financial stability are referred to as risks in this Report. These risks may arise *inter alia* from the external environment, domestic macroeconomic developments, economic policies, changes in the institutional environment or processes within the financial sector. Financial stability may be disturbed should these risks materialise, i.e. if the financial sector is hit by a shock.

The structure of this Report is similar to that of the first Report for 2004. The financial sector operates in an environment shaped by external and domestic macroeconomic developments and foreign and domestic financial markets. These topics are addressed in section 2. Section 3 analyses developments in the domestic corporate sector and households. These are the main debtors and creditors of financial institutions and represent the primary source of credit risk for them. Attention is also paid to developments in the real estate market. Section 4 focuses on financial institutions themselves, analysing the financial sector's structure, profitability, efficiency, loan portfolio quality and compliance with prudential criteria. All these factors can affect the performance and capital strength of financial institutions and consequently also their ability to cope with potential shocks. The last section discusses the development of the financial infrastructure, i.e. the interbank payment system and the short-term bond system, whose smooth operation is a key prerequisite for financial stability.

The Report newly includes four thematic articles relating to financial stability issues. The first article presents stress testing of the banking sector. In addition to updating the stress tests conducted in the previous Financial Stability Report, we have widened the range of stress tests to include testing of the impacts of alternative macroeconomic scenarios and an analysis of the risk of interbank contagion. The stress testing uses outputs from a credit risk model, which is described in the second thematic article. The model predicts the share of bad loans in the overall loan portfolio in response to the evolution of key macroeconomic indicators. The third article addresses the issue of insolvency law, including past and present changes thereto, in relation to financial stability. The last article analyses the cost efficiency of banks in order to examine the hypothesis of whether falling cost efficiency can signal the risk of bank failure. The Report ends with a list of all abbreviations used in the Report.

The Report analyses the evolution of relevant indicators, focusing on 2005. Where 2005 data were not available, data for the previous period were used.

This Financial Stability Report was approved by the Bank Board of the Czech National Bank on 11 May 2006. It is available in electronic form at www.cnb.cz

2 THE MACROECONOMIC ENVIRONMENT AND THE FINANCIAL MARKETS

2.1 THE EXTERNAL MACROECONOMIC ENVIRONMENT

The external macroeconomic environment is a significant factor affecting financial stability in the Czech Republic. The Czech economy is very open from the point of view of international trade. This increases the dependence of domestic economic activity on the economic performance of partner countries and exposes the economy to potential external shocks. The high financial openness of the Czech economy, resulting from strong inflows of foreign direct investment to the financial and non-financial sectors, is another important channel through which the external environment affects the economy. Major economic events abroad influence – via global financial markets – the financial conditions in the Czech economy. Developments in the Central European region as a whole, which global investors take into account when investing in Czech markets, also have some effect on the domestic financial conditions.

As regards global macroeconomic developments, three main trends became apparent in 2005: rising oil prices, widening global imbalances due to the high current account deficit in the USA, and further monetary policy tightening in the USA and partly also in the euro area. These trends were very similar to those witnessed in 2004, but the degree of their relevance as a source of potential risks is somewhat different.

The oil price growth raised concerns about the impact of this development on economic growth in the major world economies. High oil prices are a typical supply shock leading to higher inflation and weaker GDP growth. However, the analyses conducted to date suggest that world economic growth has been little affected so far, nor has any major increase in inflation been recorded. Oil prices reached an all-time high in nominal terms in April 2006. In real terms, they neared the levels recorded during the second oil shock in 1980–1981.

In 2005, the US current account deficit widened to 6.4% of GDP. The deficit was driven mainly by rising household and government sector debt. Conversely, non-financial corporations, as in previous years, showed a financial surplus. The deficit has so far been financed smoothly by capital inflows, most notably in the form of purchases of US securities by Asian central banks, institutional investors and oil-exporting countries.[1]

In 2005, the US central bank continued tightening monetary policy, raising its key rate incrementally from 2.25% in January 2005 to 4.75% at the end of March 2006. The main reason for this monetary policy tightening was an effort to return interest rates to a neutral level, from the extremely low levels which had supported the economic recovery following the cooling back in 2001–2002. Another cause for concern was the potential effect of rising energy prices – generated by the growth in oil prices – on inflation expectations in the medium run. This gradual tightening had been fully expected by the financial markets and hence was not a source of great shocks either for them or for the real economy.

Monetary policy was tightened in the euro area towards the end of 2005, when, after more than two years of flat rates, the ECB raised its key interest rate by 25 basis points to 2.25%. Another modest tightening of 25 basis points followed in March 2006. In both cases the rate increases were motivated primarily by the potential second-round effects of the oil price growth on inflation.

CHART II. 1

The oil price and GDP growth in the euro area and the USA

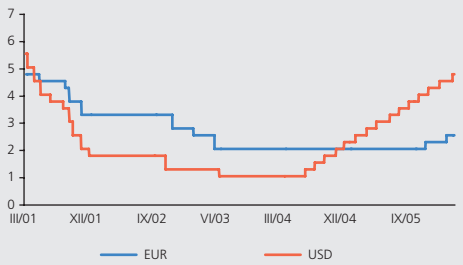
(quarterly data; year-on-year real GDP growth in %; oil price in USD/barrel)

Source: **Bloomberg, IMF International Financial Statistics**

CHART II. 2

Selected monetary policy rates

(%)



Source: **Federal Reserve Board, ECB**

1 The structure of financing of the US current account deficit is discussed for example in ECB Financial Stability Review, December 2005.

Tab. II. 1

Macroeconomic indicators for Central European countries
(estimates for 2006 and 2007)

		2004	2005	2006	2007
Hungary	GDP growth (%)	4.6	4.1	4.3	3.9
	Inflation (%)	6.8	3.6	1.9	2.9
	Fiscal deficit/GDP (%)	-5.4	-6.8	-7.2	-6.0
	Current account deficit (USD bn)	-8.9	-8.7	-9.2	-8.9
Poland	GDP growth (%)	5.3	3.5	4.5	4.6
	Inflation (%)	3.5	2.1	1.3	2.2
	Fiscal deficit/GDP (%)	-4.7	-3	-3.2	-3.0
	Current account deficit (USD bn)	-10.4	-4.8	-5.3	-7.5
Slovakia	GDP growth (%)	5.5	6	6.1	6.3
	Inflation (%)	7.5	2.7	3.7	2.3
	Fiscal deficit/GDP (%)	-3.1	-4.1	-3	-2.5
	Current account deficit (USD bn)	-1.4	-3.3	-2.5	-1.8

Source: **Eastern Europe Consensus Forecast March 2006, European Commission**

Tab. II. 2

Key macroeconomic indicators – reality and expectations
(year-on-year changes in %; estimates for 2006 and 2007)

		2004	2005	2006	2007
USA	GDP	4.2	3,5	3.3	3.0
	Household consumption	3.9	3.6	3.2	2.8
	Investment	9.4	8.7	8.3	6.8
	Industrial production	4.1	3.2	3.9	3.6
Germany	GDP	1.6	0.9	1.7	1.0
	Domestic consumption	0.6	0	0.6	0.1
	Investment	2.6	4	5.5	4
	Industrial production	2.4	2.9	3.4	2.2
Euro area	GDP	1.8	1.4	2.1	1.8
	Domestic consumption	1.4	1.4	1.5	1.5
	Investment	1.8	2.2	3.5	2.9
	Industrial production	1.9	1.2	2.4	2
	Exports	5.9	3.9	6.1	4.5
	Imports	6.2	4.7	6	4.6

Source: **Consensus Forecast (March 2006)**

Tab. II. 3

The ten most important countries in the exports and financial openness of the Czech Republic
(stock of foreign direct investment as of end-2004; exports for 2005)

Share in exports (%)		Share in stock of foreign direct investment (%)	
Germany	33.2	Netherlands	32.6
Slovakia	8.7	Germany	20.6
Poland	5.5	Austria	11.2
Austria	5.5	France	6.6
France	5.4	USA	5.2
United Kingdom	4.6	Belgium	3.8
Italy	4.2	United Kingdom	3.7
Netherlands	4.0	Switzerland	2.6
Belgium	2.7	Luxembourg	2.5
Hungary	2.7	Japan	1.5
Top-10 total	76.5	Top-10 total	90.3
EU-15	66.3	EU-15	84.9
EU-25 except CZ	84.2	EU-25 except CZ	87.5

Source: **CNB, CZSO**

The central European countries continued to show mixed macroeconomic developments. In 2005, Hungary and Poland recorded some slowdown in economic growth compared to 2004, whereas in Slovakia real GDP growth increased further. The inflation rate decreased in all countries. Public finances remained a problem in these three economies in 2005, albeit to varying extents. Poland succeeded in reducing its fiscal deficit in 2005 and is expected to maintain it at around 3% of GDP. In Slovakia the fiscal deficit widened to 4.1% of GDP, with a consolidation not expected until 2006 and 2007. The biggest public finance deficit was recorded by Hungary with almost 7% of GDP, and a further widening is expected in 2006. As regards external imbalances, the current account deficit improved in Poland and also slightly in Hungary, where, however, it remains very high at around 9% of GDP.

Developments in the external macroeconomic environment imply potential risks for the immediate future which may have an unfavourable effect on the Czech economy and its financial sector.

Unlike in previous years, the possibility of a sudden correction of global imbalances, associated with a radical weakening of the dollar against the euro and potential turbulence on the bond market, is viewed as not very likely. The available indicators do not suggest any fall in demand for dollar instruments and thereby also any difficulties with the financing of the US current account. Moreover, the tightening of monetary policy by the Fed and the shift towards neutral rates, as well as a gradual weakening of the dollar, may help gradually decrease the US current account deficit.

The major economies' resilience so far to the increased oil prices may have been based to some extent on a decrease in the profit margins of the corporate sector, which, in a situation of competitive markets, has not reflected the higher costs in its prices. The impact of any further oil price increases on inflation and economic performance, driven either by growing demand from China or possibly by unstable supply caused by natural disasters or adverse geopolitical factors, remains a significant issue.

The available indicators suggest that despite the monetary policy tightening investment and industrial activity in the USA will remain strong. Investment activity and export performance in the euro area are also assessed as solid and are expected to outpace domestic consumption, which will remain quite weak. A depreciation of the dollar vis-à-vis the euro, which would affect export performance and thereby growth in Europe, could pose a risk.

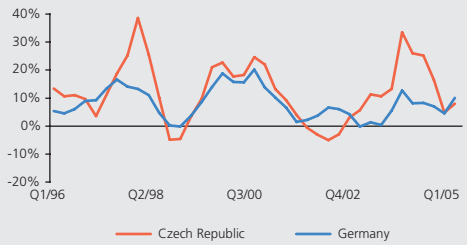
The Czech economy's export orientation is being bolstered by foreign investment inflows in the process of relocation of production from advanced countries to countries with lower costs. The newly built or purchased production facilities export most of their products either back to their parent company's home country, where they are used for final or intermediate consumption, or to third countries. On the one hand, foreign direct investment brings necessary expertise and increases the efficiency of the corporate sector, but on the other hand creates another potential channel for transmission of any external shocks to the Czech economy.

Czech exports go mainly to Germany, with the Czech Republic's other neighbours (Slovakia, Poland and Austria) trailing well behind. By contrast, the main investor in the existing FDI is the Netherlands, followed by Germany, Austria and France. In both areas of openness of the Czech economy, EU countries thus play the key role. In the case of exports, some of the new member states are also significant. This is why analysis of the evolution and outlook for growth in European economies is so important for identifying risk factors for macroeconomic development and subsequently for financial stability.

Economic activity in major regions outside Europe such as the USA or China can affect the domestic macroeconomic environment indirectly. Preliminary data indicate that only around 20% of exports from the Czech Republic are destined for final consumption in recipient countries, whereas 55% are for investment and 25% for intermediate consumption. This means that the bulk of exports will depend on corporate sector performance in the recipient country, which – in the case of an export-oriented country such as Germany – will in turn also partly depend on economic activity in third countries.[2] This relationship is illustrated by the relatively significant correlation of the export activities of Germany and the Czech Republic.

The development of some economies in the Central European region, Hungary in particular, remains a risk. The growing internal and external imbalances in Hungary may affect the risk premium demanded by investors for investment in all Central European countries, since macroeconomic imbalances in one country can be interpreted as a negative signal about the entire region. This could foster an outflow of foreign investment and increased uncertainty among domestic economic agents. Moreover, the effect could be reinforced in a situation of rising global yields and capital outflows from developing economies.[3]

CHART II. 3
Correlation of export activity of the Czech Republic and Germany
(year-on-year export growth; quarterly data)



Source: **IMF International Financial Statistics**

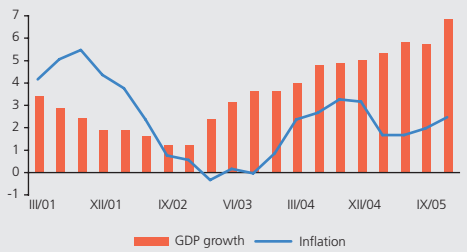
2.2 THE DOMESTIC MACROECONOMIC ENVIRONMENT

A key factor for financial system stability is sustainable economic output close to the potential output level, which does not create inflationary pressures or cause imbalances in the economy. A monetary policy contributing to the maintenance of price stability is equally important.

The domestic macroeconomic developments in 2005 and in 2006 Q1 posed no immediate risks to financial stability. Real GDP growth picked up significantly, taking the output of the economy to the potential, non-accelerating inflation level of output at the end of 2005 by the CNB's estimation. Inflation remained low, however, fluctuating below the 3% target. The higher oil prices resulted in an only moderate rise in inflation at the end of 2005.

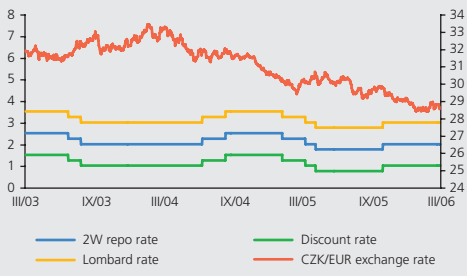
Turning to the CNB's monetary policy, interest rates were lowered three times in early 2005, largely because of a stronger exchange rate and very low inflation pressures. In 2005 Q2 and Q3, the key monetary-policy rate remained at 1.75%, as the risks to inflation were assessed as balanced. In October 2005, rates were raised by 25 basis points, primarily due to cost-push inflation pressures generated by higher oil prices. However, the effect of the higher energy prices on inflation in late 2005 and early 2006 was counteracted by faster appreciation of the exchange rate, hence there was no further tightening of monetary policy. The overall real monetary conditions in cumulative terms were assessed as easy in both components (interest rate and exchange rate) in 2005, and they will continue to positively affect economic activity in the immediate future.[4]

CHART II. 4
GDP growth and inflation in the Czech Republic
(quarterly data; year-on-year changes in %)



Source: **CNB**

CHART II. 5
CNB monetary policy rates and the koruna-euro exchange rate
(interest rates in %; exchange rate in korunas to the euro)



Source: **CNB, Bloomberg**

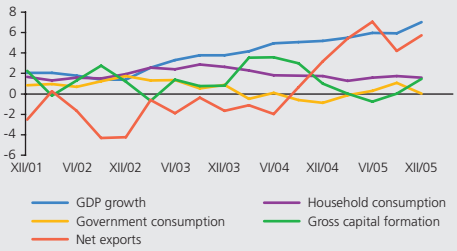
2 The USA is the second largest target country for German exports (behind France). In 2005, almost 10% of German exports were channelled to the USA.

3 The dependence of capital inflows to, or outflows from, the Czech economy on regional sentiment would be reflected in correlation of prices of financial assets in Central European economies and in particular their exchange rates against the euro or the dollar. This effect is analysed in section 2.3 *Developments on the Financial Markets*.

4 A more detailed discussion of monetary policy and the impact of the monetary conditions on real activity can be found in the CNB's January and April 2006 Inflation Reports (www.cnb.cz).

CHART II. 6

Contributions to GDP growth
(%)



Source: CZSO

TAB. II. 4

Selected macroeconomic indicators for the Czech Republic
(% of GDP)

	2002	2003	2004	2005
Public budgets				
Public budget deficit	-6.8	-6.6	-2.8	-2.6
Public debt	28.8	30.0	30.6	30.5
Balance of payments				
Current account balance	-5.6	-6.3	-6.0	-2.1
Balance of trade and balance of services	-2.0	-2.2	-0.5	2.0
Balance of income	-4.8	-4.7	-5.7	-4.9
Balance of current transfers	1.2	0.6	0.2	0.7
Foreign direct investment (FDI) in CZ	11.5	2.3	4.6	9.0
Returns on FDI in CZ	-4.3	-4.6	-5.7	-5.1
– reinvested earnings	-2.7	-2.4	-2.7	-2.7
– dividends	-1.4	-2.0	-2.7	-2.2

Source: CNB, CZSO

The positive economic trend in 2005 was chiefly driven by net exports. For the first time since 1993, net exports at current prices were positive for the whole year, and the negative net exports at constant prices decreased further. The rise in export activity in 2005 was associated not only with an upswing in investment and export activity in the euro area, but also with the launching of production facilities built thanks to foreign direct investment. Household consumption also contributed to the GDP growth, as did gross capital formation in late 2005. The contribution of government consumption was neutral.

The public budgets again showed better-than-expected results in 2005. In year-on-year terms, the public finance deficit fell to 2.6% of GDP. The total public debt is around 30% of GDP, which is a relatively low figure in European comparison. The financial market indicators do not suggest that continuing deficit financing of public budgets would affect the risk premium demanded by investors in Czech government bonds.

The current account deficit narrowed significantly in 2005, to 2.1% of GDP. This was due primarily to a trade and services surplus of 2% of GDP. The income balance, which is being driven chiefly by income from foreign direct investment in the Czech Republic, remains negative. Roughly half of the FDI income is, however, consistently reinvested in the domestic economy. FDI continued to flow into the Czech Republic in 2005. This inflow, amounting to a relatively high 9% of GDP (CZK 263.2 billion), resulted from the sale of several large companies to non-residents. Privatisation accounted for about 40% of the inflow, and the remainder was due to increases in ownership interests, reinvested earnings and the establishment of new foreign owned corporations.

The domestic macroeconomic environment in 2005 can be assessed as very favourable, with no major imbalances. Expected macroeconomic development will, however, be of key importance for financial stability in the immediate future.

The CNB's April forecast predicts that the strong real GDP growth recorded in 2005 will continue in the following two years. Present economic output is assessed as being roughly at the potential, i.e. non-accelerating inflation level of output. The real monetary conditions, which affect future economic activity, can be assessed as slightly tight overall in 2006 Q1. The interest rate component is neutral to slightly easy, whereas the exchange rate component is tight. Higher growth will continue to be counteracted by weak external demand. Inflation will fluctuate around the inflation target in both coming years. Consistent with the forecast is interest rate stability initially and a gradual rise in rates thereafter, although this will depend to a large extent on the evolution of the exchange rate.

The Czech economy is characterised by specialisation in the manufacturing area, particularly manufacture of transport equipment and components, which has a very important position in the structure of the economy. The dependence of economic activity on the external environment due to the export-orientation of the Czech economy may thus be reinforced by dependence on global demand for a certain type of products, in this case automobiles and other products in the SITC 7 category.[5] For a small economy, however, a certain degree of specialisation within the international division of labour may be a necessary precondition for successful economic development.

5 At the end of 2005, exports of products in the SITC 7 category – Machinery and transport equipment – accounted for 54% of total exports. Manufacture of motor vehicles is the fourth most important industry with respect to the stock of FDI in the Czech Republic (accounting for about 8% of all existing FDI). Other firms are linked with this industry indirectly, as subcontractors and providers of services to manufacturing enterprises.

The structure of the Czech economy may become a potential risk. The Czech economy is dominated by large firms, which mostly have a foreign owner and belong to groups operating world-wide. Numerous other domestic businesses act as their suppliers. The economy is thus more dependent on strategic decisions made by several large agents. A potential outflow of investment due to cost optimisation would have substantial impacts on both the real and financial sectors.

Exchange rate developments may pose a risk to future economic growth and thereby also the financial stability of a very open economy. The existing evidence suggests that the exchange rate develops in certain waves. Any excessive appreciation of the exchange rate could thus have an adverse effect on exporters.[6]

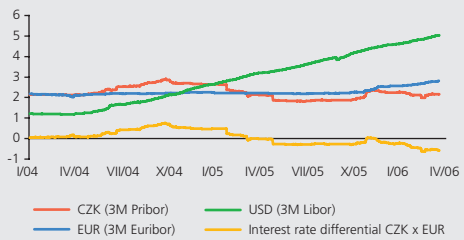
2.3 DEVELOPMENTS ON THE FINANCIAL MARKETS[7]

Developments on domestic and foreign financial markets are a key factor for financial stability. Prices of financial assets affect the financial sector's stability both directly, since financial assets in principle form a large part of assets of financial institutions, and indirectly, through their impact on the real sector. Cross-border flows of financial assets determine the degree of dependence of the Czech economy on external financial conditions and indicate potential channels for cross-border transmission of shocks.

2.3.1 The Money Market

The interbank money market and short-term capital market with maturities of up to one year is one of the most important segments of the financial markets with regard to financial stability. Firstly, money market yields co-determine the financial conditions under which the real sector is financed. Many loans to non-financial corporations, the government and even some households have an interest rate fixed for only a short period (e.g. three months) and this rate is then regularly re-fixed according to existing yields on the money market.[8] Any sudden and large change in short-term interest rates can thus greatly affect borrowers' ability to repay their obligations. Secondly, increased volatility of short-term yields can negatively affect the middle and longer end of the yield curve, as it can change expectations of future yields and raise the risk premium demanded by investors. A shock to the entire yield curve can have an adverse effect on both the real and financial sectors. Thirdly, the money market is used by banks to redistribute free liquidity, so efficient operation of the money market contributes directly to the stability of the whole banking system. Finally, the money market is the area of the financial market where the central bank can, via its operations, intervene in the event of turbulence or a liquidity crisis and where it acts as lender of last resort.

CHART II. 7
Three-month interest rates
(%)



Source: **Bloomberg**

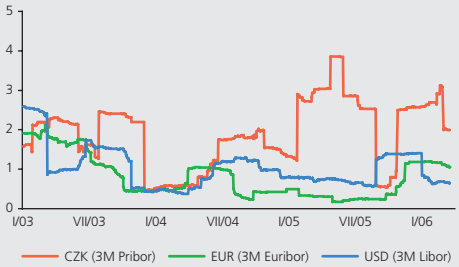
6 The article *Summary of the Results of Stress Tests in Banks* in the thematic part of this Report tests the impact of several alternative macroeconomic scenarios, based on the risks described here, on the Czech banking sector.

7 In this section, in line with other central banks' financial stability reports, the term financial markets means domestic and international money, bond, stock and foreign exchange (and, where relevant, derivatives) markets on which market participants trade financial assets at agreed prices. Attention is therefore given to price indicators (interest and yields) and to quantitative indicators such as capital flows, cross-border in particular. These are financial markets in the narrower sense. In the wider sense, the term financial markets often – especially in legislative parlance – means the financial sector as a whole.

8 The available data show that in 2005 up to 90% of new credit to non-financial corporations was provided with a fixation of up to one year or with a variable rate (including bank overdrafts); see section 4.4.2 *Loans and Credit Risk*.

CHART II. 8

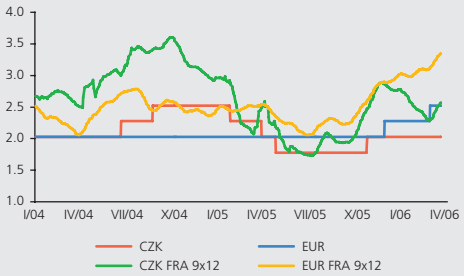
Historical volatility of short-term interest rates
(standard deviation of daily changes in past 90 days in basis points)



Source: **Bloomberg**

CHART II. 9

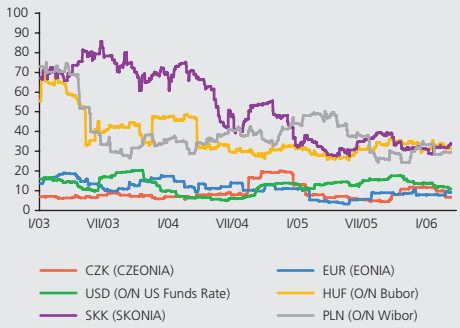
Expected path of monetary policy rates according to forward rate agreements
(%; forward rate agreement (FRA) rates as 15-day moving average)



Source: **CNB, Bloomberg**

CHART II. 10

Historical volatility of O/N interest rates for selected currencies
(standard deviation of daily changes in past 90 days in basis points)



Source: **Bloomberg**

Money market developments reflect the settings and manner of implementation of monetary policy. As regards the financial conditions, the main factors relevant to the Czech real and financial sectors are the money market yields for the Czech koruna, the euro and the dollar. The short-term interest rates of the koruna, euro and dollar continued to show different trends in 2005. Three-month dollar rates continued rising in line with the gradual tightening of US monetary policy, increasing from about 2.5% at the start of 2005 to 5% in March 2006. By contrast, three-month euro rates remained flat at about 2% in the first three quarters of 2005. These rates saw a modest rise only in October 2005, reflecting speculation on an increase in ECB policy rates in the context of the rising prices of oil. Three-month short-term rates continued rising following the actual monetary policy tightenings in the euro area in December 2005 and again in March 2006, reaching 2.7% in March 2006.

Three-month koruna rates (PRIBOR) were falling in 2005 H1, in line with the easing of monetary policy, and stabilised around 1.8%. They increased only in October, when the CNB raised its policy rates. Although the market expected further rate increases, a subsequent exchange rate appreciation dampened the inflationary pressures and there was no further increase in rates. The PRIBOR reacted by modestly declining to about 2% in March 2006. The different trends in short-term euro and koruna rates were reflected in a narrowing of the interest rate differential, which has been negative since 2005 Q2.

While the volatility of short-term dollar and euro rates was low in 2005, the volatility of koruna rates increased slightly, particularly at the time of the rate cuts in 2005 H1 and also at the time of the rate increase at the end of the year. This may reflect some uncertainty associated with the future development of the CNB's policy rates. From the perspective of the Central European region, however, the volatility of koruna money market rates is very low and corresponds to that in the advanced dollar and euro markets.

Money market developments should not be a source of shocks to the real and financial sectors in the period ahead. The financial markets expect euro area rates to rise somewhat further, but envisage no sudden and shock tightening of monetary policy which would increase volatility. Any further rise in euro rates could have some effect on Czech rates via the exchange rate. Forward rate agreements (FRAs), however, predict that koruna and euro rates will follow different paths.[9]

The risks arising from the functioning of the money market can be assessed as limited, primarily thanks to the excess liquidity in the banking sector. The CNB absorbs this by means of repos, thereby helping to stabilise the money market and fostering very low volatility of O/N rates.[10] The daily volume of liquidity absorbed fluctuated around CZK 45 billion in the last four months of 2005 (the total volume of banking sector liquidity absorbed by the central bank was roughly CZK 450 billion). Compared to money market turnovers (see the box *Structure and Liquidity of the Money and Foreign Exchange Markets*) free liquidity represents an important cushion protecting the banking sector to a large extent if a bank runs into liquidity difficulties.[11] Banks can also use the CNB's automatic marginal

9 An FRA is an agreement between two market participants to exchange, in the future, the difference between the contracted rate and the short-term interest rate on the settlement date. The FRA rates quoted in the market thus represent the best estimate of future money market rates, if we ignore the effect of the risk premium.

10 O/N money market rates are the rates at which banks borrow money from one another overnight. Some central banks calculate a weighted average of these rates as a reference value (e.g. the CZEONIA – Czech OverNight Index Average – in the Czech Republic and the EONIA in the euro area).

11 The risk of interbank contagion, although generally evaluated as small, is analysed in detail and tested in the article *Summary of the Results of Stress Tests in Banks* in the thematic part of this Report.

lending facility and obtain a collateralised loan to bridge any shortage of liquidity.[12] The collateral banks can use primarily includes T-bills, long-term government bonds and CNB bills, which the CNB provides to banks as collateral in repos. The data on bank assets suggest that banks hold quite large quantities of such securities. The CNB has not so far been forced to actively apply its role of lender of last resort beyond the limits of the automatic marginal lending facility.

Box 1: Structure and Liquidity of the Money and Foreign Exchange Markets

A functional interbank money market with a corresponding structure and a full range of financial instruments reduces the probability of a liquidity crisis and helps stabilise financial intermediation. Effective functioning of the foreign exchange market is similarly important for financial stability, especially in the case of an economy that is open in terms of both trade and finance. The database for analysing both relevant markets is obtained from a regular survey of daily turnovers on the money and foreign exchange markets, conducted by the CNB twice a year.[13] The conclusions of the analysis are as follows.

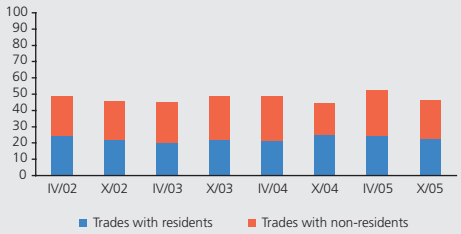
Average daily turnover on the money market has been stable over the last four years, moving around CZK 50 billion, with transactions with non-resident banks accounting for about 50% of the total. By contrast, the average daily turnover on the foreign exchange market has increased in the same period from about CZK 65 billion to the present roughly CZK 90 billion, i.e. by more than 30%.[14] This is due mainly to an increase in transactions with non-resident financial institutions, which account for most of the turnover (about 75%). These figures illustrate the relatively high international integration of the Czech banking sector in terms of ownership and in other respects. From the point of view of financial stability, this may represent another potential channel of shock transmission.

The bulk (always more than 95%) of the trades are deposit transactions with maturities of up to three months. Repos are used very rarely between commercial banks and are not used at all in transactions with non-residents. From the financial stability point of view this increases the risk of interbank contagion, since deposit transactions are uncollateralised instruments.[15] Wider use of collateralised instruments is probably being prevented by the currently inadequate legal regulation of repos, which should, however, improve with the implementation of the European Master Agreement. Some role was also being played by the excess liquidity in the banking sector and the daily presence of the CNB on the market, which although on the one hand may be helping to stabilise the money market, on the other hand might be hindering the further development of interbank liquidity trading.

Additional information on the structure of the money market is provided by disaggregated data on unsecured O/N deposits reported for the purposes of calculating the CZEONIA. According to the data for the last four months of 2005, the average number of unsecured O/N deposits deposited by reference banks in the domestic interbank market fluctuated around CZK 17 billion, i.e. almost 80% of all unsecured deposits on the interbank market.

Chart II. 1 box

Turnovers on the koruna money market by counterparty
(CZK billions)



Source: CNB

Chart II. 2 box

Turnovers on the foreign exchange market by counterparty
(CZK billions)

Source: CNB

Tab. II. 1 box

Concentration and liquidity of the koruna money market
(amounts in CZK millions; concentrations in %)

	Daily turnovers on money market				Czeonia
	Deposit operations			Repos	
	Total	Residents	Non-residents		
Amounts	45,914	22,059	23,855	281	17,517
Top-5	55.9%	56.6%	70.3%	100.0%	69.6%

Note: Daily averages for October 2005; for CZEONIA for September-December 2005.

Source: CNB

12 Banks make minimal use of this possibility, usually doing so at the end of the reserve maintenance period. The average volume is in the tens to hundreds of millions of koruna only, i.e. a fraction of the free liquidity in the market.

13 The survey always takes place during one week in April and one week in October. Banks report average daily turnovers on the koruna money market and the foreign exchange market by counterparty and instrument. Transactions with the CNB are not included. Aggregated results are available on the CNB website (www.cnb.cz).

14 The data on the daily turnover on the foreign exchange market only cover transactions where one party is a bank or foreign bank branch in the Czech Republic. Koruna transactions between non-residents are not included.

15 Uncollateralised deposits are also a dominant money market instrument in other economies; in Hungary, for example, they account for about 75% of total turnover (see the article *Developments in the Structure of Financial Markets* in Report on Financial Stability, Magyar Nemzeti Bank, October 2005).

TAB. II. 2 BOX

Concentration and liquidity of the foreign exchange market
(amounts in CZK millions; concentrations in %)

	Total	CZK/EUR		CZK/USD	
		Spot	Outright forward + FX swap	Spot	Outright forward + FX swap
Amounts	87,875	11,037	10,643	1,119	34,355
Top-5	67.5%	69.3%	75.5%	83.6%	79.0%

Note: Daily averages for October 2005.

Source: **CNB**

Outright forwards and FX swaps are the most widely used instruments on the foreign exchange market, accounting for 73% of all transactions. The share of spot transactions is about 26% of total turnover. Options are used to only a small extent. Trading in the CZK/EUR currency pair[16] represents only about 25% of total daily turnover, while trades in the CZK/USD segment have a higher share (around 40%). On the spot market, however, the CZK/EUR segment is the most important, with a share of about 50%.

An analysis of the disaggregated data for 2005 H2 reveals the degree of concentration of the two financial markets. The five most active banks (i.e. those with the largest shares in turnover) accounted for about 55% of the total turnover in money market deposit instruments. The repo instruments market is basically used by just four banks. It is also interesting that the five most active banks accounted for 70% of the turnover of all money market trades with non-residents, but for roughly 56% of the turnover of all trades with residents. The concentration in the O/N deposit segment is around 70%. The foreign exchange market is slightly more concentrated: the five most active banks accounted for around 70% of total daily turnover. The level of concentration in the CZK/EUR segment is similar. The concentration in trading in the CZK/USD pair is even higher, at around 80%.

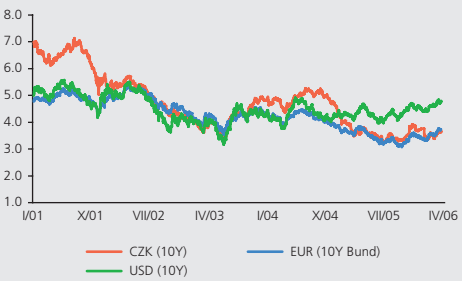
The important thing as regards price stability is the extent to which the most active banks overlap in individual segments. The analysis of the disaggregated data reveals that these banks overlap only partly in the individual segments of both markets. This reduces the risk of transmission of external shocks (trades with non-residents) to the domestic sector and also between individual markets or segments.

2.3.2 The Bond Market

Yields on the bond market not only determine the real sector's financing conditions, but also directly affect the financial sector's profitability, as bonds are one of the main investment instruments of banks and other financial institutions. A sharp increase in long-term yields may result not only in the real or government sector having difficulties servicing its debts, but also in a fall in prices of securities in banks' portfolios. The combined effect of these two channels could have a very adverse effect on the stability of the financial system.

CHART II. 11

Yields on long-term government bonds
(yields on 10-year government bonds in %)



Source: **CNB, Bloomberg**

The long-term financial conditions of the Czech economy are influenced to some extent by long-term yields on international markets, in particular yields on benchmark government bonds in the USA and the euro area. Unlike in 2004, when the long-term rates of the two major world currencies moved broadly together, 2005 was characterised by rather different trends for the two currencies. Dollar bond yields continued rising steadily, from about 4% at the start of 2005 to around 5% in March 2006, reflecting a change in the monetary-policy setting from very easy to more neutral. Nonetheless, despite this policy tightening, dollar yields are still very low by historical standards.[17] By contrast, euro yields continued declining, reaching low levels of around 3% in mid-2005.[18] They then rose very slightly to stand at still relatively low levels around 3.7% at the end of March 2006.

16 Transactions involving the two respective currencies.

17 In both nominal and real terms, these are very low values from the perspective of the last few decades.

18 These are the lowest values in both nominal and real terms since the introduction of the euro in 1999.

Yields on long-term government bonds in the Czech Republic kept on declining in 2005, moving in line with euro yields. The long-term interest rate differential of the koruna against the euro fell to zero at the start of 2005 and since then has been fluctuating in the range of +/- 10 basis points. The yield differentials of the Czech koruna are, together with the Slovak koruna, the lowest in the Central European region. Yields on other currencies (HUF, PLN) and their differentials against euro yields were also decreasing during 2005, probably in response to the lower-than-expected inflation.

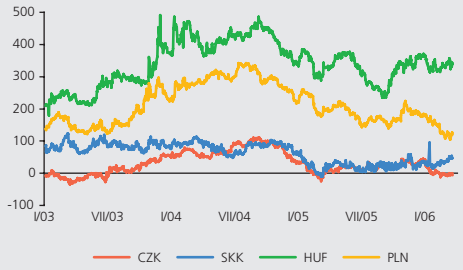
The monetary policy tightenings in the USA and the euro area had yet to have much effect on long-term dollar and euro yields and led only to a flattening (and even a slight inversion in the case of the dollar) of the yield curve. This may have been due to some structural factors associated with the high demand for long-term instruments primarily on the part of institutional investors (pension and conservative investment funds, life-insurance companies), Asian central banks and also oil exporting countries.[19] The slope of the Czech yield curve declined slightly in 2005.

In recent years, the low government bond yields in the USA and the euro area countries have resulted in "search for yield", reducing the risk aversion of market participants. This has triggered strong demand for riskier instruments, including emerging market bonds and speculative-grade corporate bonds and stocks. The increased demand is attributable not only to traditional institutional investors, but also to some unregulated financial institutions of the hedge fund type. The "search for yield" has led to a fall in the yield differentials between risky instruments and risk-free government bonds to historical lows, as illustrated by the EMBI Global and Euro EMBI Global indices of market sentiment.[20] Part of the decline in Czech long-term yields during 2005 may be due to the increased global demand for emerging market instruments.

The current developments on the bond markets may indicate the following areas of risks to the financial stability of the Czech economy.

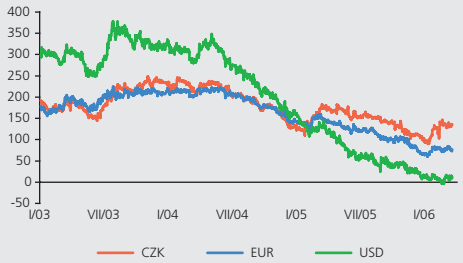
Firstly, although the very low interest rates (particularly in real terms) facilitate the financing of the real sector and enhance economic growth, at the same time they may lead to a build-up of risks in both the financial and real sectors. The low yields are supporting the rise in household and corporate indebtedness and may result in lending to riskier borrowers and riskier projects in an effort to maintain profitability. This may become a problem when rates return to the neutral level. Low interest rates can also strongly stimulate consumption and financial and real investment and theoretically generate inflationary pressures and bubbles on asset markets, including the real estate market (for an analysis of the real estate market see section 3.3 *Property Prices*). On the other hand, the low interest rate differential of the koruna against the euro reduces the motivation of households and corporations to borrow in foreign currency. This decreases foreign exchange risk and its potential pass-through into credit risk. The problem of the rapid growth in real sector debt denominated in foreign currency is most apparent in those Central European economies where the yield differential is relatively high and shows no apparent downward trend (e.g. Hungary).

CHART II. 12
Long-term interest rate differentials of selected currencies vis-à-vis the euro (10Y Bund)
(basis points)



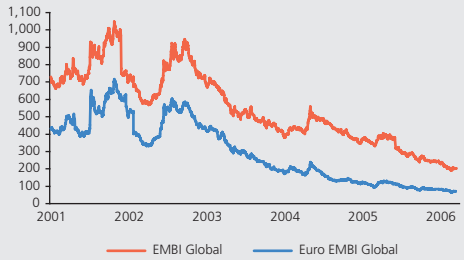
Source: **Bloomberg**

CHART II. 13
Yield curve slopes of selected currencies
(10Y swap rate minus 1Y money rate in basis points)



Source: **Bloomberg**

CHART II. 14
Yield differentials of risky government bonds
(EMBI Global – weighted spread of yields on emerging-market bonds denominated in dollars; Euro EMBI Global – weighted spread of yields on emerging-market bonds denominated in euros; in basis points)



Source: **JP Morgan**

19 In the case of Asian central banks, this is a "forced" demand generated by the need to sterilise the inflow of dollars through interventions on the foreign exchange market. For a discussion of factors which in 2005 contributed to the high demand for long-term dollar investment instruments, see, for example, *ECB Financial Stability Review December 2005*.

20 These are at historical lows for at least the period since 1993, when the EMBI Index was calculated for the first time.

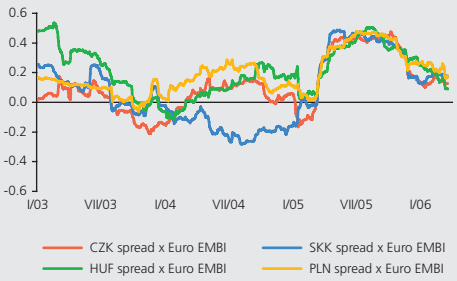
Secondly, a sudden reversal in market sentiment on global markets might be a significant factor affecting financial stability. Market sentiment is affected by the outlook for yields on secure or low-risk government bonds with high rating. In the past market sentiment typically displayed some cyclicality. Since about 2003, however, the fluctuations in the yield differentials of riskier instruments have been subdued, which raises concerns about whether investors are correctly assessing the risks. Any change in market sentiment could result in a substantial upward correction and some overshooting of yield differentials with a negative impact on borrowers' financial conditions.[21]

The gradual tightening of monetary policy in the USA and the euro area may help to change market sentiment about the emerging markets. However, the EMBI Global yield spread index reacted to this tightening to a minimal extent and for only a short time, roughly in mid-2004, and then continued on its downward trend. Underlying this persistence of positive market sentiment we can also find some structural factors, including the effort of institutional investors to hold a higher proportion of riskier assets than before and a growing volume of funds managed by hedge funds, which invest in riskier instruments.

Thirdly, the stronger dependence of domestic yields on global sentiment may pose a potential risk to the domestic financial and real sectors, especially in the event of a reversal in global risk aversion. An analysis of the correlation between the Euro EMBI Global market sentiment index and the spreads of Central European government bonds denominated in domestic currency reveals two interesting aspects of the developments over the past three years or so.[22] The correlation of yield differentials with the Euro EMBI is similar for all four Central European economies. This suggests that investors assess these countries in a very similar manner and that their yields are similarly sensitive to changes in the market sentiment. The increase in correlation observed in 2005 can be interpreted as a prevalence of global trends amid an absence of signals from the domestic environment. The decrease in correlation observed in late 2005 and early 2006 would then indicate a weakening of the dependence on global sentiment. The fluctuating dependence on global sentiment does not guarantee, however, that any global shock will not affect Czech yields. The degree of dependence may in fact increase in a situation of global turbulence.

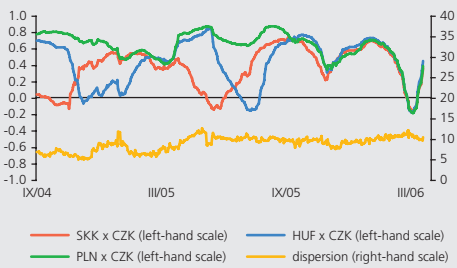
Fourthly, the strong correlation of changes in yields in Central European countries may be another factor affecting Czech bond yields. Investors may not differentiate sufficiently between individual countries in the region. Any local turbulence generated by another country could affect Czech yields via a higher risk premium. The relatively high correlation of the differentials of Czech eurobond yields vis-à-vis German yields with the differentials of eurobond yields in Slovakia, Hungary and Poland vis-à-vis German yields in some periods suggests that investors really do view the countries of the Central European region in a similar way. Their interest may thus be driven by local market sentiment.[23] Counteracting this hypothesis, however, is the fact that the dispersion of the differentials of the individual

Chart II. 15
Correlation of Central European long-term spreads with the Euro EMBI
(moving correlation of weekly changes in differentials in 180-day window)



Source: JP Morgan, Bloomberg

Chart II. 16
Correlation of spreads of euro-denominated bonds and their dispersion
(moving correlation of daily changes in spreads in 90-day window; dispersion as standard deviation of spreads)



Source: JP Morgan, Bloomberg

21 De Allessi Gracio et al. (2005) estimate that only about 20% of the decline in the EMBI Global can be explained by improved fundamentals of developing economies. The remainder reflects the current excess liquidity on international markets and a high risk tolerance (see Cristiana De Allessi Gracio et al., Capital Flows to Emerging Markets: Recent Trends and Potential Financial Stability Implications, Bank of England, Financial Stability Review, December 2005).

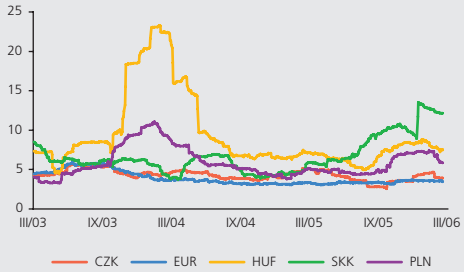
22 Using the EMBI Global, which captures the evolution of spreads of bonds denominated in dollars, the conclusions are very similar.

23 The yield differentials of Central European government bonds denominated in the euro vis-à-vis German yields show – in addition to liquidity differences – only country risk, as these yields do not directly incorporate the risk of future inflation, economic growth and exchange rate changes as perceived by investors.

countries measured by the standard deviation is virtually unchanged over time. The changes in spreads may move together, but their levels are still different and reflect the diverse development of fundamentals in the individual countries.[24]

Strong dependence of Czech long-term yields on market sentiment on global markets is prevented not only by the credibility of the CNB, which pursues monetary policy under an inflation targeting regime and stabilises inflation expectations, but also by euro adoption as expected by investors, which stabilises the longer end of the Czech yield curve. The volatility of long-term rates has stayed relatively low in recent years and is the lowest in the Central European region. Moreover, it is showing signs of declining to the level of volatility of euro yields.

CHART II. 17
Historical volatility of long-term yields
(standard deviation of daily changes in past 90 days in basis points)



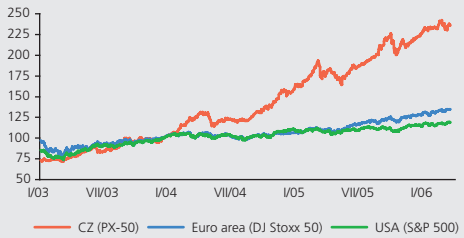
Source: CNB, Bloomberg

2.3.3 The Stock Market

The relevance of the stock market to financial stability is limited in the Czech economy.[25] Turbulence on domestic or foreign stock markets should not have any marked direct effect on the portfolios of domestic banks and other financial institutions or on households' assets. That said, any turbulence on the stock market could have some indirect effect on the stability of the Czech financial system. Firstly, problems on foreign stock markets could be reflected in a change in market sentiment to which the entire domestic financial market could react. Secondly, owing to the high involvement of foreign investors, turbulence on the domestic stock market could have major effects on the stability of the currency and consequently indirectly on the stability of short-term or long-term interest rates. Thirdly, any fall in the shares of European banks operating on the Czech banking market could also have some effect on the Czech financial sector.

Compared to 2004, the European stock market developed very positively in 2005. An increase in expected profitability was fostered by good export results for German firms in particular. Companies operating in the oil production and processing segment benefited from the higher oil prices. Overall, however, the impact of the higher energy prices on stock markets was negative. Besides corporate results, data on the economic recovery in Europe were an important stimulus. The DJ Stoxx 50 index, which tracks the prices of 50 major European stocks, grew by about 20% in 2005. By contrast, stock market growth in the USA was rather subdued in 2005, mainly because of the Fed's monetary policy rate increases and temporarily also due to natural disasters and concerns about the impact of higher oil prices on the profitability of US corporations. All this was reflected in only 4% growth in the S&P 500 index in 2005.

CHART II. 18
Developments on stock markets in the Czech Republic, the euro area and the USA
(index; 1 January 2004 = 100)



Source: Bloomberg

The Czech stock market, like the other stock markets in the Central European region, benefited from stronger foreign investor demand in 2005. The PX-50 index rose by about 40% year on year. This was due to low interest rates and excess liquidity on international markets and the relatively positive outlook for the profitability of corporations listed on the Czech market.

Primary issuing activity on the Prague Stock Exchange was again fairly subdued in 2005. There were only two new issues on the public market (only one in 2004). Moreover, these were again double listings, as the stocks had already been traded on some foreign markets.

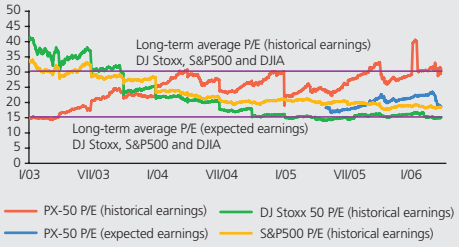
24 In 2005, the average spread of Czech eurobonds against German Bunds was 7 basis points, whereas that of Slovak, Hungarian and Polish eurobonds was 13, 20 and 27 basis points respectively (in the case of SK, HU and PL these are weighted averages of all eurobonds issued).

25 The Czech stock market is relatively small by international comparison (market capitalisation was 45% at the end of 2005, compared to 80%-100% in advanced European countries) and its relevance as a source of finance for the development of the real economy remains limited. Only 39 share issues are listed on the Prague Stock Exchange (PSE). More issues are listed on the off-exchange RM System, but this is aimed more at retail investors.

CHART II. 19

P/E ratios

(P/E ratio = price-to-earnings ratio; historical and expected earnings)

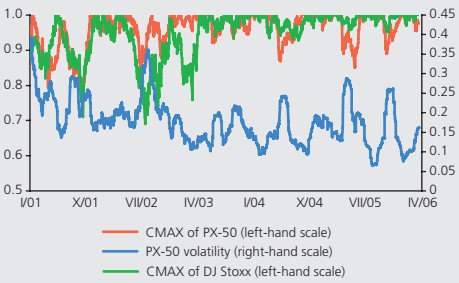


Source: **Bloomberg**

CHART II. 20

CMAX index and stock market volatility

(CMAX: ratio of current index level to maximum level in past 60 days; historical volatility: annualised monthly standard deviation of logarithm of daily yields)

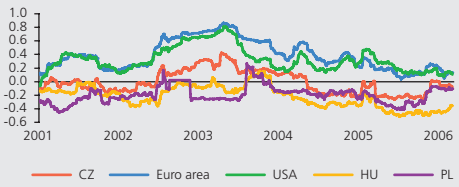


Source: **Bloomberg**

CHART II. 21

Correlation of bond and equity yields for selected countries

(moving correlation of weekly changes in yields and index in 180-day window)

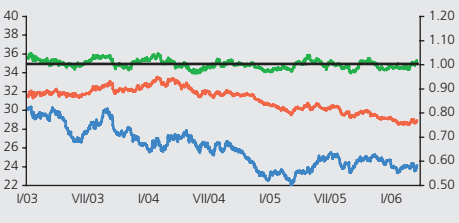


Source: **Bloomberg**

CHART II. 22

Nominal exchange rate of the koruna against the euro and the dollar

(in CZK per unit of foreign currency; return as ratio of current level to level 90 days ago)



Source: **Bloomberg**

The potential risks arising from developments on the stock markets can be concentrated in three areas: the potential emergence of a bubble on the market, the dependence of the domestic market on foreign markets and the potential interdependence of several financial market segments.

Firstly, one of the prerequisites for a sound stock market is that prices should realistically reflect future revenues and should not be driven by excessive expectations. If a price bubble is created on the market, its subsequent bursting can adversely affect market volatility, investor confidence and financial stability. The P/E ratio[26] is somewhat higher for Czech equities than for the average on European stock exchanges (DJ Stoxx) or on US stock exchanges (S&P 500, DJ Industrial Average). The P/E ratios of around 30 based on historical earnings and around 20 for expected earnings do not, however, indicate the formation of a bubble. This is confirmed by the fact that while the PX-50 has more than doubled since the start of 2004, the P/E ratio has remained almost unchanged.

Secondly, owing to the substantial participation of foreign investors the Czech stock market may be sensitive to changes on other stock markets. Volatility abroad may spill over to turbulence on the domestic market. Volatility tends to be asymmetric, being higher when the stock index falls than when it grows.

A similar path of the CMAX index, which measures the degree of asymmetry of stock movements, for the European and Czech markets illustrates the dependence of domestic developments on those abroad. Fluctuations in volatility are associated with a decline in the market index. This is consistent with the existing evidence about developments on stock markets. The sensitivity of the domestic stock index to index movements abroad is interesting. Up to 2003 the Czech stock market reacted to changes in the DJ Stoxx Index with lower elasticity, whereas since 2004 its reaction to fluctuations on the European market has shown higher elasticity. This may be linked with the rise in trading activity on the Czech stock market following the Czech Republic's accession to the EU and the inflow of foreign portfolio investment.[27]

Thirdly, the effect of transmission of turbulence abroad to the domestic stock market could further strengthen if the turbulence spreads to other segments of the domestic financial market, e.g. the bond market. An analysis of the correlation of changes in bond yields and changes in yields on stock markets reveals that the countries of the Central European region are characterised, particularly in the period since 2004, by negative yield correlation, i.e. share prices and bond prices rise or fall together. This may be caused by the participation of foreign investors, who may consider the two instruments as similarly risky assets and buy or sell them together. On the euro area and US markets, by contrast, the yield correlation is positive, as investors move their assets from risky securities to safe securities and vice versa. Any turbulence on the domestic stock market could therefore truly foster an outflow of foreign investors with a negative effect on other segments of the financial market.

2.3.4 The Foreign Exchange Market

The exchange rate is one of the most important variables for an open and internationally highly integrated economy, influencing both the real and financial sectors. Excessive fluctuations in the exchange rate can present a risk to financial stability. A strong and sudden appreciation of the domestic currency can increase the credit risk of exporters. Conversely, a strong depreciation of the currency has an adverse effect on debtors who are indebted in foreign currency, as it increases loan servicing costs. Moreover, a strong exchange rate fluctuation or a long period of excessive misalignment can have an unfavourable effect on expectations of economic agents, thus amplifying the economic cycle.

26 The P/E ratio is the ratio of share price to past or expected earnings per share.

27 The volume of share trades executed by non-residents increased by 30% year on year in 2004 and by another 50% in 2005.

The koruna-euro exchange rate saw a slight appreciation of the koruna in the first half of 2005, relative stability in the summer months and a further appreciation at the end of 2005. The koruna-euro rate showed a year-on-year appreciation from around CZK/EUR 30.30 in January 2005 to around CZK/EUR 28.70 in January 2006. The prevalence of periods of koruna appreciation in the past two years is illustrated in the 90-day return curve. Most of the fluctuations are below the exchange rate stability axis. The koruna-dollar rate also continued to appreciate, although it was indirectly determined by the koruna-euro rate through the euro-dollar cross rate. The appreciation of the koruna in recent years has been due to the improving economic performance of the Czech Republic, increased interest in investment in the Czech Republic and positive expectations regarding the Czech economy.

Three areas of potential risks to financial stability can be identified in the area of the foreign exchange market and the exchange rate: strong fluctuations in the exchange rate or exchange rate developments not supported by fundamentals; potential dependence of movements in the koruna exchange rate on market sentiment about Central European economies; and interdependence with other segments of the domestic financial market.

Indicators of the historical volatility of returns on the foreign exchange market and the implied volatility derived from currency option prices show that the volatility of the koruna's exchange rate against the euro (historical as well as implied) is lower than on advanced markets (EUR/USD) or on other Central European markets (HUF/EUR).[28] Implied volatility reflects the opinion of market agents on future volatility and thus is a useful indicator of expected development on the market. The correlation between implied and historical exchange rate volatility, particularly from 2004 H2 onwards, suggests that market agents basically capture future volatility well in their predictions, although they are rather conservative, expecting higher levels than those recorded later.

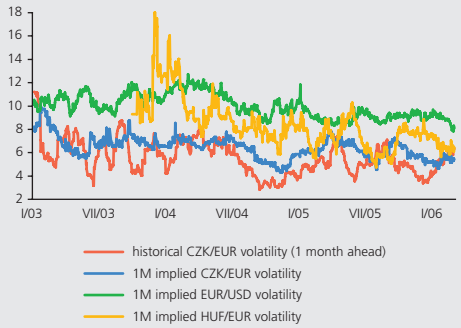
The effect of a slight increase or decrease in exchange rate volatility on financial stability is not entirely clear cut. Higher volatility can force economic agents to hedge against exchange rate changes, thus increasing the economy's resilience to shocks stemming from the foreign exchange market.[29] On the other hand, on a highly volatile market there is a greater probability of an extreme shock.

Data on implied volatility from currency option contracts also allow us to estimate what probability the market attaches to large and sudden changes in the exchange rate. In the early months of 2005 the market attached a higher probability to an extreme depreciation (greater than 3%) compared to an extreme appreciation (greater than 3%) at the one-month horizon, but at the beginning of 2006 the situation reversed, with the market attaching a higher probability to an extreme appreciation of the koruna than an extreme depreciation. In both cases, however, the probability of an extreme movement is assessed as very small (less than 5%).[30]

Second, the dependence of the koruna-euro exchange rate on market sentiment towards all the Central European markets might pose some risk to the foreign exchange market. Any problems in neighbouring countries in the region, should they generate a change in market sentiment, might have an adverse effect on the Czech koruna's exchange rate. An analysis of the correlation of the koruna exchange rate and the exchange rates of the Central European currencies against the euro does indeed suggest that the degree of correlation of the Central European exchange rates increased quite significantly in 2005.

CHART II. 23

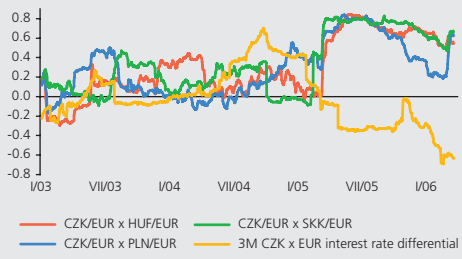
Historical and implied exchange rate volatilities
(annualised monthly standard deviation of logarithm of daily returns in %)



Source: **Bloomberg**

CHART II. 24

Correlation of exchange rates in the Central European region
(moving correlation of weekly changes in 90-day window)



Source: **Bloomberg**

28 CZK/USD volatility is likewise low.

29 There are no official statistics on the extent of non-financial corporations' hedging against exchange rate risk. Anecdotal evidence suggests that exporters now use hedging transactions to a larger extent than in 2001-2002, when they were hit by an appreciation shock.

30 The methodology for deriving the probability with which the market expects changes in the exchange rate is described, for example, in Cincibuch, M., and Bouc, P. (2004): An Interpretation of Czech FX Options. Finance a úvěr – Czech Journal of Economics and Finance 7-8/2004, pp. 286-304.

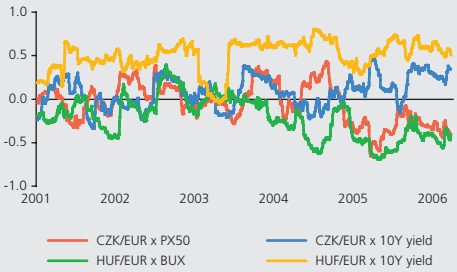
However, the correlation between the koruna-euro exchange rate and the exchange rates of other Central European countries declined again at the beginning of 2006. The different exchange rate developments can be explained by the fundamentals in individual economies, the effect of political events and by the interest rate differential against the euro. The widening negative interest rate differential of the koruna vis-à-vis the euro is stimulating the use of the koruna as a cheap financing currency for investment in other currencies. This might have counteracted the effect of the Central European market sentiment.

Third, a higher degree of correlation on the foreign exchange market and other financial markets could be another risk affecting financial stability. Foreign investors enter the Czech financial market through the foreign exchange market and first buy (or borrow against a foreign currency) Czech korunas to purchase Czech securities. Higher volatility on one market will thus affect other markets, which could exacerbate any market turbulence.

An analysis of the correlation of koruna-euro exchange rate changes and the returns on other assets in the Czech Republic and Hungary indicates that the correlation between exchange rate change and yields on equities and bonds in the Czech Republic fluctuated until 2004. This correlation increased in 2005: the appreciation is becoming increasingly correlated with stock index growth and declining bond yields. In Hungary, this correlation pattern has persisted for some time. While part of the correlation between bond yields and the exchange rate can also be explained by expected movements in central bank interest rates in response to the appreciation of the currency, the correlation of changes in the exchange rate and equities is probably due to foreign investor activity.

Chart II. 25

Correlation of changes in the exchange rate and other financial assets
(moving correlation of weekly changes in 90-day window)



Source: **Bloomberg**

Tab. II. 5

Average daily turnovers on the foreign exchange market
(USD millions; CZK for October 2005, HUF for 2005 Q4)

	Total			Spot		
	All monitored currencies	EUR	USD	All monitored currencies	EUR	USD
CZK	2,388	899	1,438	505	447	45
HUF	3,371	876	2,350	855	657	118

Note: Includes transactions where at least one party is a bank in the Czech Republic/Hungary

Source: **CNB, MNB**

An illiquid foreign exchange market might have an adverse affect on financial stability, as it could foster higher exchange rate volatility. The available data allow us to compare daily turnovers on the foreign exchange market with Hungary.[31]

Liquidity in currency pairs including the Hungarian forint is higher than in pairs with the Czech koruna. Only in the overall view covering spot transactions as well as derivatives (forward contracts, swaps, options) is liquidity in the pair with the euro comparable. Most contracts in the Czech Republic and Hungary are with non-residents (70%–80% of all contracts). Other aspects of the liquidity and structure of the Czech foreign exchange market are given in the box *Structure and Liquidity of the Money and Foreign Exchange Markets* in section 2.3.1 *The Money Market*. Overall, the risks associated with liquidity on the foreign exchange market can be assessed as small.

Box 2: Consequences of Capital Inflow and the Risk of Cross-Border Contagion

The strong inflow of capital in recent years has increased the integration of the Czech economy into international financial markets. Non-residents have a significant share in the equities of the financial and non-financial sectors thanks to past foreign direct investment. Moreover, they hold a range of other securities as portfolio investment, for example Czech government and corporate bonds and shares traded on stock exchanges. Prices of assets on the Czech financial markets often change in line with global market sentiment.

The dominance of foreign players on domestic territory may generate concerns about whether the Czech financial and real sectors are becoming too dependent on foreign factors. One of the traditional problems discussed in analyses of financial stability for strongly financially integrated markets is the risk of cross-border contagion. A shock which affects one country can generate turbulence on financial markets and spill over to other countries through existing links and financial

31 The latest BIS global survey of foreign exchange market turnovers, to which almost all central banks report their data, was carried out in April 2004. The next one is planned for 2007. The CNB surveys foreign exchange market turnovers twice a year and the MNB quarterly.

exposures. The issue of cross-border contagion has often been mentioned as one of the triggers of the Asian financial crisis in the latter half of the 1990s. The Czech Republic experienced this phenomenon during the currency crisis in 1997.[32]

The risk of cross-border contagion increases in particular if the cross-border exposures of global agents have very short maturity and investors can thus liquidate them virtually instantly. The table shows that the Czech Republic had the largest share of long-term international claims from foreign banks at the end of 2005.[33] Nevertheless, the share of short-term claims remains relatively high at 30%. The Czech Republic also has a relatively small share of international claims not allocated by maturity, i.e. equities, which could be liquidated by foreign investors, be they foreign direct investment or portfolio investment.

The second factor affecting the risk of cross-border contagion is concentration of foreign claims. For example, if foreign claims are concentrated with one large creditor and that creditor is hit by a shock which forces it to liquidate its foreign investments, the impact on the debtor country will be certainly greater than if the domestic economy uses foreign capital from several countries. The following table shows that foreign claims are relatively concentrated in the case of the Czech Republic (the three most important creditor countries hold around 80% of all foreign reported claims) compared to other countries of the region.

The third factor which co-determines the degree of risk of cross-border contagion is the degree of similarity of the creditor structures of individual debtor countries. For example, if a debtor country was hit by a large shock and all the creditors of that country were affected, it is possible that they would also withdraw their exposures from other countries where they have their claims. If the creditor structure of another country was completely identical to that of the country affected by the primary shock, this other country would also probably be hit by an investment outflow to the same extent.

To capture the degree of similarity of creditor structure, the Common Creditor Index is used. This ranges in value from 0 (no common creditor) to 1 (completely identical creditor structure).[34] The last table shows that the Czech Republic's creditor structure is broadly similar to that of Slovenia, Slovakia and Hungary, but less similar to that of Poland and other Central and Eastern European countries. However, the picture may be distorted by the inclusion of the claims of subsidiaries of reporting banks, including loans with longer maturities, which probably could not be instantly liquidated in the event of cross-border contagion.

The analysis suggests that the integration of the Czech economy into international financial markets and the high share of foreign ownership and capital flows into the Czech economy may create channels for the transmission of foreign shocks and foster greater susceptibility to the risk of cross-border contagion. Nevertheless, any contagion through the cross-border claims channel would have to be generated by a large shock in the source country with a major impact on creditor countries. Given the heavy involvement of advanced economies as creditors of the Czech economy and the relatively small share of claims on the Czech Republic in the creditors' total portfolios, the risk of cross-border contagion can be assessed as limited.

Tab. II. 3 box

Maturity structure of international claims
(% of all international claims)

	Up to and including 1 year	More than 1 and less than 2 years	More than 2 years	Not allocated by maturity
Czech Republic	30.7	3.0	53.8	12.5
Hungary	28.5	5.8	44.8	20.9
Poland	24.6	6.0	51.1	18.4
Slovakia	33.8	2.8	32.1	31.2
Slovenia	30.6	5.5	51.2	12.8
NMS-8 average	30.6	6.5	46.8	16.1

Source: BIS International Banking Statistics

Tab. II. 4 box

Foreign claims by country of origin
(2005 Q3; % of all foreign claims, including exposures of local subsidiaries of reporting banks)

	AT	BE	DE	FR	GR	JP	NL	SE	USA	Top 3
Czech Republic	38.3	22.0	10.5	18.7	0.0	0.4	2.7	0.0	2.5	78.9
Hungary	27.4	11.2	30.3	3.7	0.0	1.3	3.6	0.1	2.4	68.9
Poland	8.6	6.7	28.2	2.8	0.0	2.5	10.4	2.0	5.3	47.3
Slovakia	54.8	7.5	9.0	1.3	0.0	0.2	5.2	0.1	2.1	71.3
Slovenia	40.4	6.7	29.1	9.5	0.2	1.3	0.9	0.1	0.4	79.0
NMS-8	26.3	11.2	20.8	7.1	0.0	1.2	5.1	6.4	3.0	58.2

Source: BIS International Banking Statistics

Tab. II. 5 box

Common Creditor Index
(2005 Q3; 0 no common creditor, 1 same creditor structure)

	EE	HU	LV	LT	PL	SK	SI	BG	RO	CR	TR
CZ	0.2	0.6	0.2	0.2	0.4	0.6	0.7	0.5	0.6	0.5	0.4

Source: BIS International Banking Statistics, CNB calculation

32 A description of the 1997 currency crisis and the role of cross-border contagion can be found in Šmídková, K. et al. (1998): Koruna Exchange Rate Turbulence in May 1997. Monetary Policy Division Working Paper 2-98, CNB.

33 The BIS data make a distinction between *international claims*, which comprise (i) claims of non-resident banks on domestic entities except banks owned by reporting non-resident banks (*cross-border claims*) and (ii) loans granted by banking subsidiaries directly in the territory of the given jurisdiction in foreign currency (*foreign currency local claims*), and *local claims*, which comprise claims of banking subsidiaries on residents in local currency only. *Foreign claims* are then the sum of international and local claims. International claims in the BIS statistics thus overestimate the true extent of international claims.

34 For a description of the methodology, see Van Rijckeghem, Caroline and Weder, Beatrice (2001): Sources of Contagion: Is it Finance or Trade?, Journal of International Economics 54(2), pp. 293-308.

3 THE CORPORATE AND HOUSEHOLD SECTORS

3.1 NON-FINANCIAL CORPORATIONS

The development of the corporate sector is important for financial stability, most notably because non-financial corporations are the most important debtor of banks. Unlike in previous years, when loans to non-financial corporations tended to decline, non-financial corporations have since mid-2004 been contributing to the relatively fast annual rate of growth of lending to the private sector, accounting for around 38% of the growth rate of total lending (for details on the growth rate of loans by sector, see section 4.4.2 *Loans and Credit Risk*). The financial situation of non-financial corporations is also important for households' balance sheets. Non-financial corporations are major employers and contribute to payments of wages to the household sector, thereby influencing its main source of income.

3.1.1 Large Enterprises (100 Employees or More)[35]

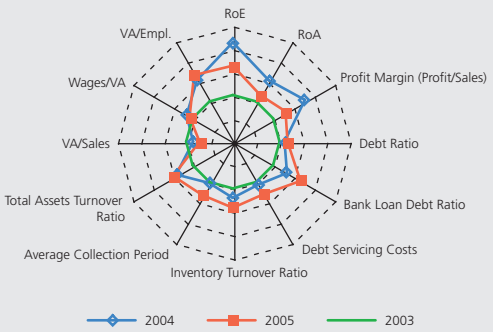
The situation in the sector of large enterprises is important primarily because such enterprises often determine the development of the whole corporate sector. Large enterprises are leaders in innovation. Many smaller enterprises are dependent on them either directly (as subcontractors) or indirectly (e.g. providing services in a region in which a large enterprise operates).

In 2005, GDP growth picked up further and the main turnover characteristics of the corporate sector improved (industrial production, exports, value added). However, the financial ratios of large non-financial corporations worsened from the very high levels of 2004. Year-on-year deteriorations were seen mainly for all profitability ratios. Return on equity declined to 12.7%, return on assets slipped to 12.9% and return on turnover fell to 5.9%.[36] The decline in profitability ratios was due to the aforementioned increases in turnover indicators and equity rather than a decline in the absolute profitability of the sector (which fell by just 0.3%). The 2005 profitability level was, with the exception of 2004, the best since 1997.[37]

The sector of large non-financial corporations saw a partial improvement in its debt ratio[38], which declined from 46.9% to 46.4%. In parallel with the decline in total debt, there was a decrease in debt to the banking sector (from 12.6% to 11.8%). In both cases, the decline in debt reflected an increase in assets (or equity), with the external funds of enterprises with 100 employees or more growing, albeit relatively slowly. A decline in interest rates also led to lower debt servicing costs.

CHART III. 1

Key financial indicators for non-financial corporations
(2003=100; index > 100 – improvement; index < 100 – deterioration)



Source: CZSO, CNB calculation

35 The breakdown into large, small and medium-sized enterprises is based primarily on the number of employees. Enterprises are usually divided into "micro-enterprises" with 1-9 employees, "small enterprises" with 10-99 employees, "medium-sized enterprises" with 100-249 employees, and "large enterprises" with more than 250 employees (see Act No. 47/2002 on the support of small and medium-sized enterprises). In this Report, the term "large enterprises" refers to enterprises with 100 employees or more, mainly because current and relatively detailed data are available for this category. The CZSO also regularly publishes data for enterprises with 20-99 employees. However, these data are far less detailed. Some sections of this Report will refer to this category. Data for enterprises with 1-19 employees, as well as a detailed breakdown of financial indicators by size of enterprise, are published by the CZSO only once a year with a relatively long lag (the latest available data are for 2003).

36 Return on Equity (RoE) = Earnings before Taxation/Equity
Return on Assets (RoA) = (Earnings before Taxation+Depreciation+Interest Expenses)/Total Assets
Profit to Sales Ratio (or Profit Margin) = Earnings before Taxation/(Sales of Goods + Sales of Own Production)

37 The comparison of growth in the absolute levels of the financial indicators is somewhat limited by a change in the set of monitored enterprises. In all, 108 enterprises were added to the set in 2005, which constitutes 2.5% of the number in 2004.

38 The interpretation of the debt ratio is rather unclear. On the one hand, growing debt strengthens leverage. If the interest rate remains unchanged, an increase in debt leads to a higher return on equity at any given absolute level of profit. On the other hand, a rise in debt generates risk for creditors of non-financial corporations (in particular banks). The chart and the text look at the issue more from the creditors' viewpoint, so an improvement in the debt ratio means a decline in debt. However, the first approach is applied in the analysis of annual changes in RoE.

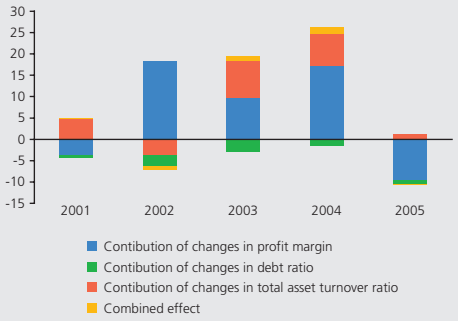
The assets turnover ratio improved as well (the inventory turnover ratio declined from 43 to 41.2 days, the average collection period fell from 99.5 to 94 days, and the assets turnover ratio decreased from 314.9 to 311.4 days). This mainly reflects the aforementioned rise in sales of enterprises.

An analysis of the annual change in return on equity[39] reveals that in 2005 the decline in RoE was largely due to enterprises' reduced ability to generate profits from their increasing sales volumes. The positive contribution of a lower assets turnover ratio continued into 2005. This contribution was, however, smaller than in recent years (around 15% compared to 2003 and 2004). This may suggest a termination or slowdown in the positive contributions of asset restructuring to RoE growth, which was mainly recorded for foreign owned corporations. The declining indebtedness of non-financial corporations with 100 employees or more decreased the RoE in 2005. The total contribution to the decrease in RoE was, however, smaller than in recent years.

A closer look at the breakdown of profitability by the main NACE[40] industrial categories reveals that there is some convergence of profitability between the individual categories underlying the decline in RoE. Profitability declined relatively more in industries with a higher absolute level of profitability in 2004, while industries with lower profitability recorded a rise or a more moderate decline. The "double-peak" character of this distribution is gradually disappearing, with profitability being more evenly distributed across the NACE categories.

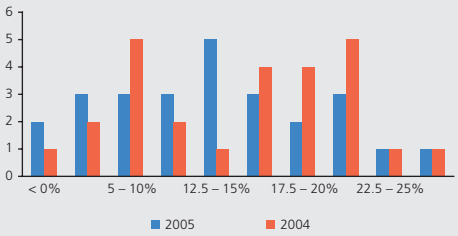
This trend is due to the increasing profitability of non-financial public corporations. Although the profitability of private foreign controlled non-financial corporations recorded the largest decline, it remained the highest. The profitability of national private non-financial corporations also showed a decline, falling below the profitability of non-financial public corporations at the end of the year. This may signal the beginning of problems in this sector caused by the appreciation of the exchange rate at the end of 2005.[41] Compared to public corporations, private non-financial corporations are also subject to significantly higher competitive pressures, making it difficult for them to increase their prices when costs rise, which necessarily affects their profitability.[42] The decline in RoE is also being dampened by an increase in the share of the relatively most profitable foreign-controlled corporations at the expense of public corporations. This is associated, among other things, with the continuing privatisation of state property.[43]

CHART III. 2
Contributions to year-on-year change in return on equity
(p.p.)



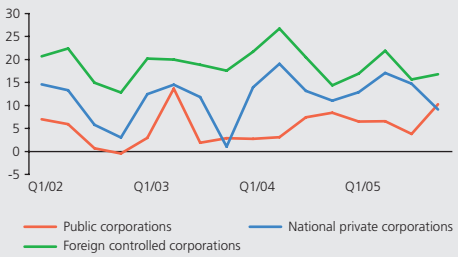
Source: CZSO

CHART III. 3
Change in RoE distribution for large enterprises
(≥ 100 employees)



Source: CZSO

CHART III. 4
Profitability (RoE) by main sectors
(%)



Source: CZSO

39 The following relationship holds:

$$RoE = \frac{Profit}{Equity} = \frac{Profit}{Sales} \cdot \frac{Sales}{Assets} \cdot \frac{Assets}{Equity} = Profit\ margin \cdot \frac{360}{Assets\ turnover\ ratio} \cdot \frac{1}{1 - Debt\ ratio}$$

The percentage change in the RoE can be thus approximated by the percentage change in the profit to sales ratio, the percentage change in the inverse of the assets turnover ratio and the percentage change in the inverse of the ratio of equity to assets. This approximation is not entirely accurate, with the "combined effect" in the chart reflecting the error of this estimate.

40 NACE denotes the Industrial Classification of Economic Activities. A description of this classification is available on the CZSO website http://www.czso.cz/csu/klasifik.nsf/i/odvetvova_klasifikace_ekonomickych_cinnosti_(okec)

41 An appreciation of the exchange rate can be expected to have the strongest impact on private domestic non-financial corporations. Public domestic corporations have a relatively low share of exports in sales, being thus relatively little sensitive to the exchange rate. Private foreign-controlled corporations have greater opportunities to diversify exchange rate risk within the group. The impacts of the exchange rate appreciation have yet to pass through into the financial results of the corporate sector and they cannot be expected to show up fully before 2006.

42 Enterprises from the public non-financial corporations sector are more often active in sectors with a higher degree of concentration (e.g. electricity generation). The monopolistic or oligopolistic character of such sectors enables them to increase prices more easily.

43 In particular, the privatisation of the Unipetrol holding company and Czech Telecom in 2005.

Tab. III. 1

Contributions to change in RoE between 2005 and 2004
(p. p.)

		Change in RoE in p.p.	Share in equity (weight)	Contrib. to total change	Share of contrib. in category
Industries with negative contribution	Transport, storage and communication	-1.90%	19.16%	-0.36%	21.95%
	Trade, repairs	-3.69%	6.66%	-0.25%	14.80%
	Manufacture of basic metals and fabricated metal products	-3.14%	5.40%	-0.17%	10.21%
	Manufacture of rubber and plastic products	-7.01%	2.37%	-0.17%	10.02%
	Manufacture of electrical and optical equipment	-3.82%	3.69%	-0.14%	8.50%
	Manufacture of transport equipment	-1.84%	5.82%	-0.11%	6.47%
	Others with negative contribution	-1.38%	33.66%	-0.47%	28.05%
	Total with negative contribution	-2.16%	76.75%	-1.66%	100.00%
Industries with positive contribution	Mining and quarrying of energy producing materials	9.60%	3.77%	0.36%	64.86%
	Manufacture and repair of machinery and equipment	1.69%	2.82%	0.05%	8.51%
	Manufacture of food products, beverages and tobacco	0.96%	4.59%	0.04%	7.90%
	Real estate, renting and business activities	2.02%	1.92%	0.04%	6.95%
	Others with positive contribution	0.65%	10.17%	0.07%	11.78%
	Total with positive contribution	2.40%	23.25%	0.56%	100.00%
Corporations with 100 empl. or more, total.*		-1.11%	100.00%	-1.11%	

Note: * Owing to rounding errors the change in total RoE in p.p. is not exactly equal to the sum of the contributions.

Source: **CZSO, CNB calculation**

An analysis of profitability across the NACE categories identifies other reasons for the worsening profitability in 2005. Table III.1 shows that the general worsening of profitability was moderated by improved profitability in mining and quarrying of energy producing materials. This would seem to be due to the increase in oil prices last year and the related rise in prices of substitutes. On the other hand, the high oil prices negatively affected economic performance in the transport, storage and communication category. Its contribution to total profitability was exactly the opposite of that of mining and quarrying of energy producing materials. The high prices of oil and energy seemed to have negatively effected other sectors, for example wholesale and retail trade, repair of motor vehicles and personal and household goods (transport costs), manufacture of basic metals and fabricated metal products (high energy intensity of production) and manufacture of rubber and plastic products (where oil is one of the main production inputs).

A large contribution to the decline in aggregate profitability in manufacture of transport equipment and manufacture of electrical and optical equipment is due to the significant share of exports in sales (74.9% and 80.2% respectively in 2004). These sectors were affected by the appreciation of the exchange rate at the end of 2005. The key industry manufacture of transport equipment continued to record above-average profits in 2005, despite some decline (RoE 16.7%).

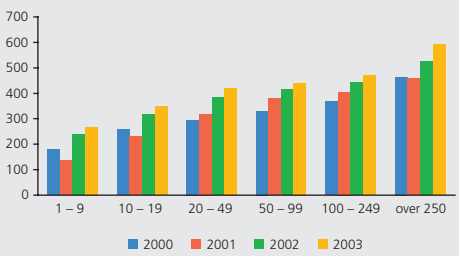
The relatively favourable trend in manufacture of food, tobacco products and beverages seems to be due to the positive impact of EU accession and the lifting of some barriers to trade in this area. The trend in real estate, renting and business activities is associated with growth in housing construction and related developer services and with the relatively stable property prices (see section 3.3 *Property Prices*).

3.1.2 Small and Medium-Sized Enterprises (1–99 Employees)

The discussion on the corporate sector is mostly based on analyses of large enterprises. However, as regards the number of non-financial corporations, the small and medium-sized enterprise (SME) sector is definitely more important (with SMEs accounting for 99.6% of the total). The SME sector contributes significantly to value added (46.4% of total value added in 2003), employment (48.1%), investment (41.0%) and total output (49.1%). Therefore, the SME sector is undoubtedly important for any evaluation of financial stability.

Chart III. 5

Value added per employee by size of enterprise
(CZK thousands per year; classification by number of employees)



Source: **CZSO**

The SME sector is specific. In particular, "micro-enterprises" involve a larger proportion of small businesses, which often combine pure business activities with activities of the entrepreneur as a consumer or household. Micro-enterprises often employ family members of the entrepreneur, meaning that, for example, data on wages paid can be distorted. Unlike large enterprises, SMEs have a significantly lower share of foreign-controlled corporations. Such enterprises can be expected to be more dependent on the domestic financial sector for the financing of their activities. At the same time, their access to capital markets is limited when obtaining funding sources. Thus, financing comes largely from the domestic banking sector or from their own resources.

The data available for all types of enterprises[44] (indicators relating to value added and employment) clearly demonstrate a trend of improvement in most financial indicators over time across the size categories of enterprises. As regards value added per employee, there is an apparent link with enterprise size: larger enterprises have a much greater ability to generate value added per employee.[45]

44 In contrast to large enterprises, there is relatively little information on financial indicators for the SME sector. Moreover, it is available with quite a long time lag (more than two years). Detailed information on financial indicators for the SME sector is hampered mainly by the more limited accounts kept by such enterprises.

45 This is due, among other things, to the fact that this indicator was calculated using the average number of employees. Using the average registered number of employees (which is lower, as it also counts the length of employees' working hours) does not imply a significant increase in value added per employee for most enterprise sizes. The exception is the smallest enterprises with 1-9 employees, whose value added per employee calculated in this way is about 2.8 times higher than under the original definition, making it the highest of all the categories.

In smaller enterprises, the lower level of value added per employee is offset by lower personnel costs. Therefore, the differences between the enterprise size categories are significantly smaller for the ratio of personnel costs and value added. The best results are recorded for the category of enterprises with 1–9 employees. As regards the remaining categories, the larger the enterprise, the better the indicator.

According to the Central Register of Credits, the loan growth in 2005 was due mainly to loans to SMEs with 10–99 employees.[46] Lending to large enterprises was flat or falling, while micro-enterprises (1–9 employees) saw relatively low growth. The tendency of faster growth in lending to smaller enterprises may suggest a gradual elimination of their liquidity restrictions[47], associated with their lower indebtedness as measured by the ratio of bank loans to sales. The low growth in loans to micro-enterprises is linked with the lower quality of such loans.[48]

The rate of new defaults[49] on loans to enterprises broken down by number of employees indicates that the degree of risk of SMEs is significantly higher than that of large enterprises with more than 250 employees. While the 12-month default rate is 0.1% for large enterprises, it is around 1% for SMEs. An interesting category is that of micro-enterprises, i.e. companies with up to 9 employees. The 12-month default rate was around 5% in this segment at the end of 2003. In early 2004, it saw a considerable decline and fast convergence to the level recorded by SMEs.

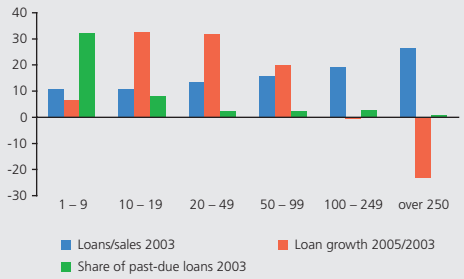
Overall, the current increase in lending to SMEs seems to be natural, being associated with their improving financial indicators. It does not seem to be creating problems for financial stability for the time being.[50]

3.1.3 Number of Non-financial Corporations

The financial soundness of corporations has improved in recent years, as indicated by the decline in the default rate on the loan portfolio of commercial banks. The improved condition of Czech corporations is also evidenced by a downward trend in the number of bankruptcy petitions filed.[51] The number of bankruptcy petitions filed declined by almost 14% year on year in 2005. Although the ratio of newly filed bankruptcy petitions to the total number of business is different in individual

CHART III. 6

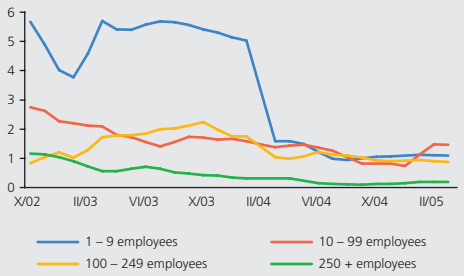
Loan growth and its determinants by size of enterprise
(%; classification by number of employees)



Source: CZSO, CNB (CRC), CNB calculation

CHART III. 7

12-month default rate of corporations by number of employees
(%)



Source: CNB

46 Data on loans from the standard bank reporting framework for the purposes of the CNB do not contain information about the structure of loans by size of the enterprise. Moreover, SMEs are recorded partly under "Non-financial corporations" and partly under "Households-trades". The only source of information about loans to SMEs is data from the Central Register of Credits (CRC) operated by the CNB (a detailed description of the CRC is provided in section 4.4.2 *Loans and Credit Risk*). Data from the CRC are not necessarily fully comparable with the data on loans from the standard bank reporting framework for the CNB and can be thus deemed illustrative only.

47 Liquidity restrictions can be associated with the existence of information asymmetry and the related problem of adverse selection. A bank does not know a borrower's real financial situation when providing a loan, unlike the borrower itself. Setting stricter lending criteria leads to higher risk borrowers participating. Liquidity restrictions can also be associated with moral hazard, i.e. a situation where a bank cannot prevent the borrower from behaving in a way leading to a rise in credit risk after the loan has been granted.

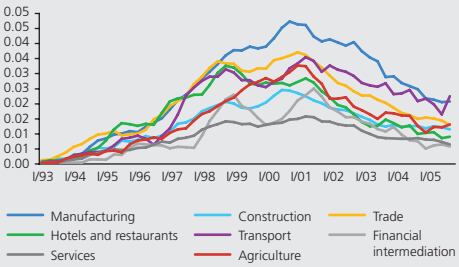
48 This category has seen some improvement, too. The share of past-due principal and interest declined from 32.3% at the end of 2003 to 20.7% at the end of 2005. These data are not fully comparable with the data on classified loans referred to in section 4, as they come from a different source. Moreover banks can classify loans which are not yet past due.

49 The 12-month default rate was calculated as the volume of loans 30-89 days past due relative to the average total amount outstanding on loan accounts in a 12-month period after the observation period. This variable can thus be observed only until March 2005 (12 months before the end of the available time series).

50 Given the limited availability of data on SMEs, it is necessary to emphasise that the statement is based on the interpretation of the currently available data. However, the absence of the latest information on the financial indicators of these enterprises still poses a problem, as their current financial situation can be derived only indirectly from aggregate data or data on large enterprises.

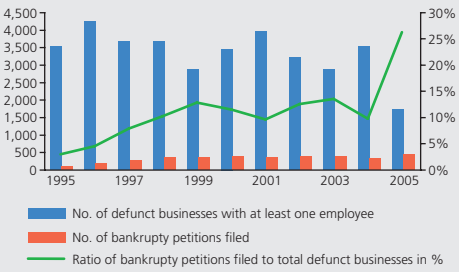
51 Although a filed bankruptcy petition does not necessarily mean adjudication of bankruptcy, these variables seem to show a close relationship.

CHART III. 8
Industry risk measured by ratio of number of bankruptcy petitions filed to total number of businesses in industry
(%; quarterly data)



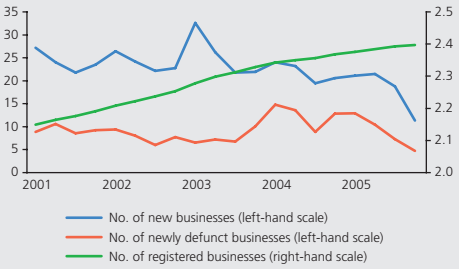
Source: CZSO, Ministry of Justice of the Czech Republic

CHART III. 9
Defunct businesses and bankruptcies
(annual data)



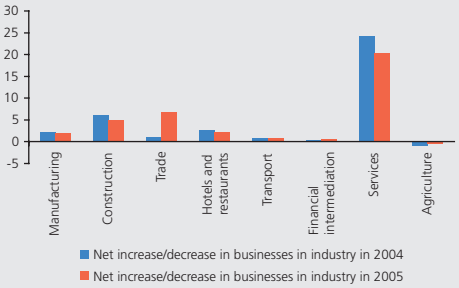
Source: CZSO

CHART III. 10
Numbers of new, defunct and registered businesses
(quarterly data; new and defunct in thousands; total number registered in millions)



Source: CZSO

CHART III. 11
Net increases/decreases in businesses by industry
(annual data; thousands of businesses)



Source: CZSO

sectors, the evolution of risk of sectors is strongly correlated. All industries have been showing a downward trend since the second half of 2001. The most problematic seem to be manufacturing and transport, and the least problematic services and financial intermediation. Trade and hotel and restaurant services, which were recording high values at the end of the 1990s, now lie between these two poles. Construction and agriculture are sectors which have long been showing an average degree of risk in the economy.

Trade accounts for the largest share in the total number of bankruptcy petitions filed (31% of all petitions for bankruptcy in 2005), followed by manufacturing (24%) and – some way behind – services (16%). Bankruptcies are not dominant in exits from the sector. In 2005, however, this indicator reached 26% for businesses with at least one employee.[52]

A long-term upward trend in the number of registered businesses has been visible since the beginning of the 1990s. This is related to the transformation from a centrally planned to a market economy. The growth has been slowing in recent years. Almost 2.4 million companies and sole traders were registered in the business register at the end of 2005 (1.2% more than in 2004, when an increase of 1.7% was recorded). The largest growth is being recorded for services businesses, while the rate of growth in the number of agriculture businesses is declining.

Risks arising from the non-financial corporations sector

Although the overall situation in the corporate sector has long been improving, some risks to financial stability can be identified. An analysis of financial indicators by NACE category indicated sensitivity to oil prices. If oil prices continue growing or remain at their current high levels in the longer term, the corporate sector's financial ratios will further deteriorate and credit risk will increase. Or, non-financial corporations will be forced to increase their prices or reduce wages, thus shifting the financial pressures to the household sector. An excessive appreciation of the exchange rate, which mainly influences the ability of corporations to generate profits from exports, could cause a similar effect.

The strengthening in the financing of SMEs is a positive manifestation of the gradual elimination of liquidity restrictions in this sector. An excessive credit expansion in this sector could, however, strengthen credit risk, owing to the generally worse financial results of this category of enterprises, a greater tendency to exit the industry and to a shortage of detailed current data on this sub-sector.

In contrast to the positive effects of foreign investment on manufacture of transport equipment[53] in the present or the near future, there may be an increase in sensitivity of corporations' financial results to external demand in the longer term. Rising concentration of production into some industries may increase the sensitivity of economic results to any problems in individual large corporations. There is also a rather longer-term possibility of transfer of such production to countries with lower real wages.[54]

3.2 HOUSEHOLDS

The household sector is important for financial stability for a number of reasons. Households are, behind non-financial corporations, the second most important debtor of the financial sector. They borrow significantly not only from banks (a detailed analysis of bank lending is provided in section 4.4.2 *Loans and Credit Risk*),

52 A bankruptcy petition was filed for a mere 3.6% of all defunct businesses in the economy in 2005.

53 In particular, manufacture of cars and related production.

54 These effects are also discussed in section 2.2 *The Domestic Macroeconomic Environment*.

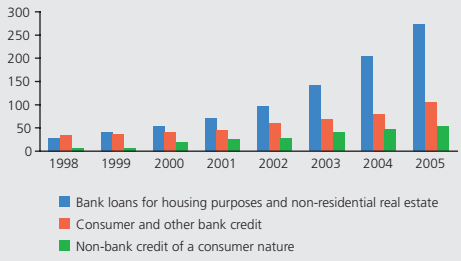
but also from non-bank financial intermediaries.[55] Household debt is the fastest growing item within bank loans. Households account for around 60% of the annual growth in lending to the private sector. They are also the most significant contributor to the financial sector on the deposits side. Their decisions on the allocation of savings can significantly affect the liquidity of the banking sector in particular and the development of new financial products.

Besides these direct effects, which are directly reflected in the assets and liabilities of the financial sector, there are a number of indirect effects. These stem from the numerous endogenous links between the household sector, the financial sector and the non-financial corporations sector. For example, a sizeable and unexpected increase in interest rates would, in addition to the direct effect on the ability of households to repay loans, be reflected in reduced disposable income and, subsequently, in lower consumer demand and in the GDP growth rate. This would, in turn, affect the credit risk of the non-financial corporations sector. Similarly, an increase in wages has a positive effect on the credit risk of the household sector on the one hand, but on the other hand has a negative impact on the corporate sector. An increase in prices usually acts in the opposite way.

Despite the growth in household debt, accumulation of household loans does not exceed accumulation of financial assets.[56] The net asset position of households is thus continuing to improve in absolute terms.[57] The main contributor to the formation of financial assets is the item currency and deposits (accounting for around 50%). In connection with the development of insurance (for details see section 4.5 *Insurance Companies*), the contribution of insurance technical reserves is growing, with a share of about one-third. The contribution of securities and equity is relatively low (around 11.9%), despite an increase related mainly to rising prices of shares and bonds (see section 2.3 *Developments on the Financial Markets*). Nevertheless, the sensitivity of households' balance sheets to prices of securities is gradually increasing. Another counterpart of household debt besides accumulation of financial assets is change in non-financial assets, or gross fixed capital formation of households. Such investment usually takes the form of investment in housing construction.[58] Households' balance sheets also depend significantly on property prices, and this sensitivity is increasing over time due to frequent debt financing of household investment (property prices are analysed in section 3.3 *Property Prices*).

Although the bank deposits of households exceed their loans more than 2.5 times, households' ties to the financial sector are having a negative impact on their disposable income. The total volume of interest paid by households (interest on loans) exceeded the volume of interest received (interest on deposits) around 2.4 times at the end of 2005. The difference between interest paid and received in 2005 had a negative contribution to gross disposable income of 1.2 percentage point. The share of interest received in disposable income is essentially flat. As regards the ratio of interest paid to disposable income, the effect of increasing indebtedness is starting to prevail over the effect of the decline in nominal interest

CHART III. 12
Bank and non-bank credit to households
(CZK billions)

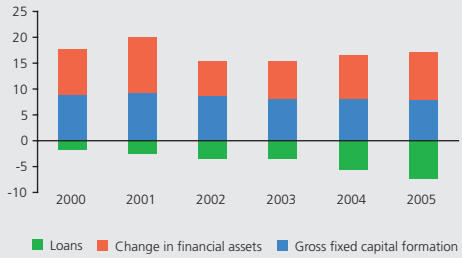


Source: CNB, ČLFA

CHART III. 13
Share of non-bank credit in household credit
(%)

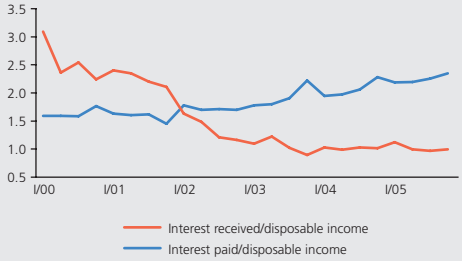
Source: CNB, ČLFA

CHART III. 14
National accounts items for the household sector
(flow per year as % of disposable income)



Source: CZSO

CHART III. 15
Shares of interest received and paid in disposable income
(%)



Source: CZSO, CNB calculation

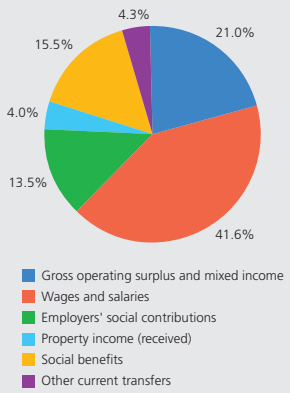
55 Non-bank providers of consumer credit gained market share particularly in 2000 and 2001. They still account for around one-third of loans of a consumer nature. Their market share in total loans is declining owing to the high growth in loans for house purchase, which are usually not offered by these institutions.

56 The ratio of newly received loans to newly purchased financial assets was 80% in 2005. The ratio of newly received loans to newly purchased financial assets plus gross capital formation in the household sector reached 42.9%. In 2000, these ratios were 20.8% and 10.3% respectively.

57 However, their percentage growth is higher than growth in deposits, owing to the low base for loans. The ratio of financial assets to financial liabilities is therefore declining.

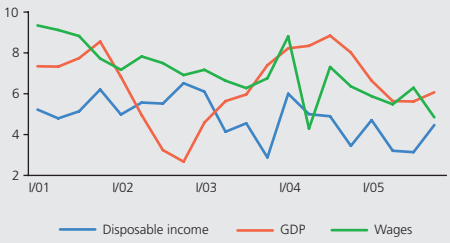
58 Households accounted for 15.7% of total gross fixed capital formation in 2005. The average share for 2000-2005 is 17.2%. Investment by households is less pro-cyclical than other investment, so the decline in share in 2005 is due rather to the favourable cyclical situation (growth in investment by other sectors).

CHART III. 16
Structure of households' current income by source
(2005)



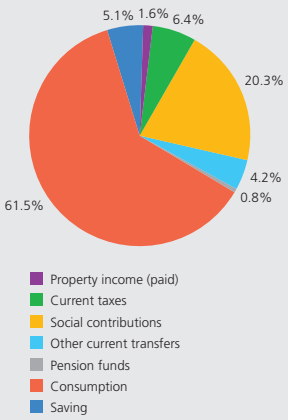
Source: CZSO

CHART III. 17
Income indicators
(year-on-year change in %; in nominal terms)



Source: CZSO

CHART III. 18
Structure of households' current income by use (expenditure)
(%; 2005)



Source: CZSO

rates, and the ratio of interest paid to disposable income is increasing. The risk of changes in interest rates may thus impact on the household sector more strongly than in the past. The sensitivity of household consumption to interest rates can also be expected to increase.

The ability of households to repay their obligations depends mainly – apart from the volume of their assets – on their future income. Wages paid to employees clearly dominate households' sources of current income. Gross operating surplus and mixed income[59] and social benefits also have high shares. Total household income is thus linked primarily with wages and employment. Average wage growth has lagged slightly behind GDP growth in the last two years. The difference between the growth rates of the economy and disposable income has been even more pronounced. Households are not fully participating in GDP growth.[60] Should this continue, or should the gap between disposable income growth and GDP growth widen further, credit risk might increase in some parts of the household sector. A decline in employment poses a potential risk in this context.[61] Other things being equal this would reduce total wages paid per capita.

A potential shock to households' incomes would not necessarily worsen their ability to repay loans. The need to repay a loan can force households to restrict their expenditure owing to a fear of enforcement of collateral in the case of a house purchase loan and the related loss of the roof over their heads, or to a fear of execution (see the box *Enforcement of Claims against Corporations and Households – Bankruptcies and Executions*).

More than a quarter of households' expenditure is associated with tax payments or social contributions, which households cannot influence very much. Around two-thirds of expenditure is available to households in the form of disposable income for consumer spending.[62] Such expenditure can be influenced by households to some extent. If there is a rise in prices of essential goods with low price elasticity, total consumer spending may grow. At a given level of income that would result in a decline in savings. In this respect, there is a risk if food prices increase. Households' balance sheets may also be negatively affected by rent deregulation and the related increase in housing costs.[63] Growth in oil prices and the related increase in energy prices may also imply pressures on households' nominal expenditure.

Information on the distribution of debt across various categories of households is important for evaluating financial stability. The national accounts data do not contain such information, so it is necessary to use family budget statistics.[64] These statistics contain *inter alia* data on new deposits and savings withdrawn for the given year as well as data on newly received loans and repayments of such loans, including links with non-banking financial institutions.

59 Gross operating surplus and mixed income are a result of the economic activity of small entrepreneurs. They reflect the profit of such entrepreneurs as well as their hypothetical wages.

60 Disposable income, which is at households' disposal for consumption and savings, differs from GDP *inter alia* in the income deficit (part of the balance of payments statistics). The slower disposable income growth compared to GDP growth is due to the relatively high income deficit.

61 At the end of 2005, some disproportion was recorded between employment, which was rising relatively sharply (a year-on-year rise of 2% in 2005 Q4), and the unemployment rate, which was falling only very slightly. One possible explanation is higher employment of non-residents. This helps explain the difference between GDP growth and disposable income growth. Wages of non-residents are excluded from disposable income.

62 The remaining income is used in the form of gross savings.

63 This, of course, applies only to households that live in dwellings with regulated rents. Households that live in dwellings with unregulated rents may profit from rent deregulation.

64 The family budget statistics are compiled by the CZSO with the aid of a survey containing information on 3,000 households. The data contain flows for the year. They are not fully comparable with the financial accounts data or the banking statistics data, which cover the household sector as a whole.

The breakdown of households by their net money income per person shows that in the last five years the most deposits were accumulated by households with higher incomes. This category also borrowed most compared to their income.[65] On the other hand, low-income households have recently been borrowing to a larger extent. The relatively high share of newly received loans in their money income does not pose too great a risk for financial institutions.[66] However, relatively high repayments on loans from previous years are negatively affecting the ability of some households to finance other expenditure and generate new savings.

This can be seen, for instance, in the category of households with minimal income, two children and one economically active person. Such households' ratio of loan repayments to annual money income is more than 6%, with the excess of savings withdrawn over deposits amounting to 8.9%. The category which currently borrows the most (that is, newly received loans minus loan repayments are the highest for them in relation to gross money income) is households with one child and one economically active parent. These are probably mostly young families.

In addition to relatively lower savings, higher dependency on social benefits is another risk factor for households with lower incomes. These may be affected in the medium term by the potential implementation of public finance reforms. On the other hand, a positive aspect from the financial stability point of view is that social benefits are the most important for households with below-average income, not for those with the lowest income, which borrow relatively little (in particular, households of old-age pensioners). A relatively high share of "essential" expenditure[67] in total expenditure is also relevant for households with below-average income. This may somewhat restrict their ability to respond to potential negative trends by reducing consumption.

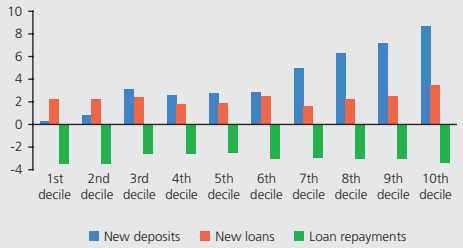
Box 3: Enforcement of Claims against Corporations and Households – Bankruptcies and Executions

Besides the persisting upward trend in debt of the sector "Households – individuals"[68], the volume of loans to corporations has also been rising since the second half of 2003. At the end of 2005, bank loans to the "Households – individuals" sector amounted to CZK 380 billion. Most of them were loans for house purchase (CZK 266 billion), while consumer credit amounted to CZK 95 billion. Total bank loans to individuals increased by 34% in 2005 compared to 2004. In addition to bank loans, the volume of non-bank loans is on the rise. Consumer credit provided by non-banks amounted to more than CZK 43 billion in 2005. Leasing companies are also contributing to the indebtedness of households and corporations. Their claims from leasing transactions stood at CZK 202 billion at the end of 2005. Bank loans to corporations totalled CZK 525 billion at the end of 2005.

Despite the upturn in lending to corporations, the number of bankruptcy petitions filed is not rising. This may indicate improving financial soundness of corporations or improved risk management in banks. Long bankruptcy proceedings and creditors' efforts to deal with corporate insolvency more efficiently, which would ensure higher recoverability of claims, may also be playing a role.

CHART III. 19

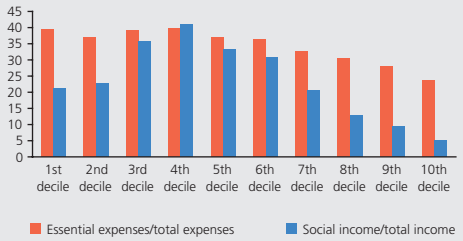
New household deposits and loans by income categories in the family accounts
(share in gross money income in %; for 2000 – 2004)



Source: CZSO

CHART III. 20

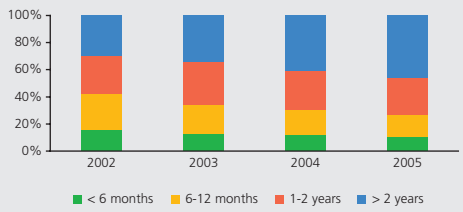
Income and expenses by income categories in the family accounts
(%; 2004)



Source: CZSO

CHART III. 1 BOX

Numbers of lawsuits caused by bankruptcy or composition by time taken to settle lawsuit
(days)



Source: Ministry of Justice of the Czech Republic

65 The category of the three deciles with the highest income accounted for 54.1% of total new loans received.

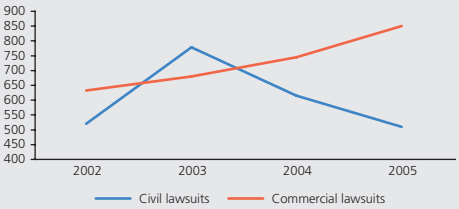
66 The category of the three deciles with the lowest income accounted for 17.6% of total new loans received.

67 Essential expenditure was calculated as the sum of expenditure on food and non-alcoholic beverages, housing and health.

68 Within the banking statistics, the "Households" statistical category comprises the subcategories "Households - trades" and "Households - individuals". These two subcategories are very heterogeneous.

CHART III. 2 BOX

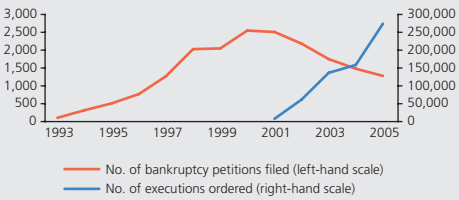
Average duration of lawsuits relating to bankruptcy or composition
(number of days)



Source: Ministry of Justice of the Czech Republic

CHART III. 3 BOX

Bankruptcies and executions
(annual data)



Source: Ministry of Justice of the Czech Republic, Chamber of Executors of the Czech Republic

The proportion of lawsuits caused by bankruptcy or composition lasting more than two years is rising. Such cases accounted for 46% of the total number of all such lawsuits in 2005, compared to 41% in 2004 and just 34% in 2003. While the average length of civil lawsuits relating to bankruptcy and composition has reduced in the last two years, the length of commercial lawsuits has increased.

If a corporation or household is not able or willing to pay its debts on time and in full, a default event occurs. Two main debt collection mechanisms are then employed – execution or bankruptcy. Composition, or compulsory composition, where debtors settle at least a minimal amount of their obligations as required by law, is theoretically possible but seldom used in practice. Unlike bankruptcy, composition is not associated with the dissolution of a legal entity.

Bankruptcy is a collective process in which creditors try to satisfy their claims to the greatest extent possible. Generally, bankruptcy can be declared on both legal entities and natural persons.[69] However, this method is virtually never applied to natural persons, as the legislation in force was primarily intended for legal entities. This should change with the enactment of new insolvency legislation with effect from 1 July 2007. In addition to the possibility of reorganisation, this contains the principle of discharge of debt, giving a debtor (natural person) the option of exemption from the payment of claims covered by the discharge of debt insofar as they were not settled in the discharge proceedings.[70]

The number of adjudicated bankruptcies shows that this mechanism started to be used increasingly during the economic slowdown at the end of the 1990s.[71] From 2002 onwards, a gradual decline can be seen in the number of bankruptcy petitions filed, which might reflect improved financial soundness of the corporate sector.

Where a debtor is in default with only one creditor, the process of satisfying the claims of the creditor can be simplified by means of execution proceedings. This is generally more efficient and shorter. However, if a creditor files a petition for execution proceedings in respect of a defaulting debtor and it later turns out that such debtor has liabilities to other creditors who subsequently file a petition for bankruptcy in respect of such debtor, the execution proceedings will be discontinued. Otherwise, one creditor would enjoy undue preference over the others.

Execution proceedings relate mostly to households, which often overestimate what they can afford and borrow more money than they are later able to repay. In particular, there are more and more cases of small debts of up to CZK 10,000. These are often unpaid fines imposed by the police and public transport operators, payments for electricity, rents, telephone bills, health insurance, etc. Three-quarters of all debts recovered in executions are claims of up to CZK 10,000. Their average collection rate is around 50%. One-fifth of cases are sums ranging from CZK 100,000 to CZK 1 million, with a recoverability of around 30% of the amount due. Only 5%–10% of sums of more than CZK 1 million are recovered successfully. Executions mainly relate to unsecured loans, with consumer credit dominating for households. Consumer loans often amount to several tens of thousands of koruna – i.e. amounts which are recovered the most successfully in executions.

69 In addition to the loss of property, anyone who has been adjudicated bankrupt must use all their future income to meet creditors' claims up to the amount due.

70 For more on the legislative aspects of insolvency law, see the article *The Impact of Insolvency Law on Financial Stability* in the thematic part of this Report.

71 The number of bankruptcies adjudicated in the Czech Republic is very low by international comparison. For example, the number per one million citizens was about four times higher in Germany than in the Czech Republic in 2005.

The most frequent methods of debt recovery by executors in 2005 included attachment of property and deductions of amounts due directly from debtors' bank accounts. As not every debtor has a bank account, executors obtained money from funds on building society accounts,[72] from pension funds or by attaching social benefits.

When opening execution proceedings, the executor first obtains the necessary information about the person in question (the addresses of the debtor and his employer, bank account numbers, etc.). By law the executor has access to the information sources of state institutions, such as the central register of citizens, and health insurance companies' data on their clients. Banks also have the duty to co-operate in execution proceedings. Moreover, executors may contact the employer and attach the debtor's future income in favour of debt repayment.

It is practically impossible to avoid repayment of debt in respect of smaller amounts due, which can be recovered quite easily from the sale of assets of the household. If a household has no financial assets, executors enter the dwelling under a court order and seize property found. If this property is not sufficient to cover the amount due, executors attach the debtor's future income. Execution proceedings are very quick and efficient and can have a very harsh impact on households.

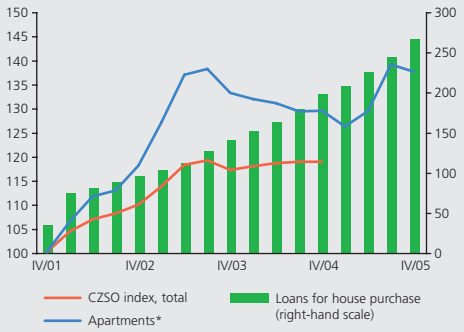
The number of executions is rising fast. There were around 155,000 cases in 2004 and more than 270,000 in 2005, representing an annual increase in adjudicated executions of 74%. Moreover, the length of execution proceedings is getting shorter. In this case, debtors have no reason to invoke procedural obstructions in the form of appeals or postponements, as it only increases their final costs in the form of interest on the amount due and the executor's fee. The Chamber of Executors is preparing a central register of executions, which will be available for a charge on the Internet from September 2006. This register should help creditors avoid selling goods under hire purchase or lending money to people who have already been subject to execution. The register may thus ultimately reduce the credit risk faced by financial intermediaries.

Banks cover default risk by means of high interest rates on unsecured loans. Therefore, if a household is not able to repay consumer credit, banks often sell off this claim to third parties, thereby removing the bad loan from their balance sheets. The loans are purchased by specialised companies engaged in subsequent recovery of such loans, which is not subject to any regulation. Such companies also often recover the uncollectible claims of non-banking financial intermediaries (such as hire purchase). In such cases, there is no execution or adjudication of bankruptcy. The claim is recovered out of court instead. Although there are no statistics on the number of claims so recovered or on the methods used, it is reasonable to assume that the impacts of such methods on households may be even harsher than execution proceedings in court.

72 Where the execution covers funds saved on building society accounts, the unfavourable impact of the execution on debtors is intensified by the fact that they lose the entire previously credited state support and interest on such support.

CHART III. 21

Property prices – transfer prices according to tax returns
(absolute index; 2001 Q4=100; loans in CZK billions)

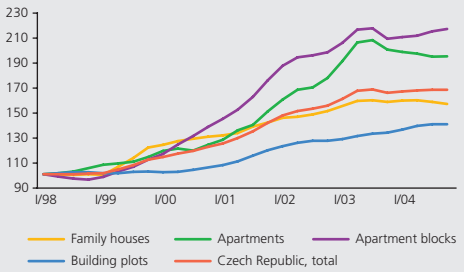


Pozn.: *For apartments calculated for 2005 using IRI figures.

Source: **CZSO, CNB, Institute for Regional Information (IRI)**

CHART III. 22

Property prices – transfer prices according to tax returns
(absolute index; 1998 Q1 = 100)



Source: **CZSO, CNB calculation**

3.3 PROPERTY PRICES

The Residential Property Market

The high growth in loans for house purchase is increasing the sensitivity of households' balance sheets to property prices. The risk of a bubble on the property market is often discussed, given the low interest rates over the last year, possible speculative purchases before the Czech Republic's accession to the EU and the growth in demand for property financed on debt. Expectations of higher prices of dwellings in response to an expected rise in VAT on housing-related construction work from 5% to 19% scheduled for the beginning of 2008, may also be contributing to the creation of a bubble.[73] Any bursting of this bubble would affect both households (through a decline in the value of their non-financial assets) and financial institutions providing loans for house purchase (through a decline in collateral value). A sudden decline in property prices might also be directly reflected in financial institutions' balance sheets via their investments in real estate or real estate investment funds. There also exists an indirect channel via lending to construction companies and, in particular, via ownership or lending links with property development companies, most of which combine construction activities with speculation on the property market.

Property transfer prices[74] show that prices of most types of property are flat or even falling slightly on the back of a relatively sharp rise in 1999–2003.[75] An exception is the building plot price index, which continued rising in 2004, although it remains lower in absolute terms compared to other types of property. The main reason for this is its low dynamics up to the end of 1990s. The recent rise in building plot prices can be thus interpreted as catch-up with other property prices linked with the residential property construction cycle.

Other property price indices are showing similar trends. In the past, apartment blocks and flats recorded above-average increases in prices. This path is essentially the same for different types of property in different regions. The only exceptions are the categories "Apartment blocks in Prague" and "Building plots in the Prague-West/ Prague-East region", which are rising about twice as fast, and the category "Building plots in Prague", which rose by around 20% less than the overall index in 1998–2004.[76] Relatively stable property prices in 2005 are also indicated by supply prices of flats in Prague, which suggest a very slight increase in prices or a stagnation at roughly the end-2003 level.

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73 The effect of the higher VAT rate on construction work will, however, be limited by the expected application of exemptions for the construction of "social dwellings" (until 2015) and for building work related to the reconstruction and repair of dwellings (until 2010), to which the reduced 5% rate should continue to apply. The definition of social housing is fairly loose, covering the construction of flats of up to 90 square metres and houses of up to 150 square metres.

74 The text differentiates between the following types of property prices: **property transfer prices**, based on Ministry of Finance statistics from property transfer tax returns and published by the CZSO. These prices are the closest to actual **market prices** in terms of methodology. There are also **property supply prices**, which indicate property sale supply prices in estate agencies and are published by the Institute for Regional Information. Supply prices should be higher than transfer prices. The last category is **property purchase prices** (provided by the CZSO), which broadly indicate the cost of building new property.

75 Average annual growth in the property transfer price index was 10.5% in the Czech Republic in 1999-2003. By contrast, residential property prices in the euro area increased by 6.1% on average in 1999-2004. In 2004, the property transfer price index increased by just 1.4% year on year in the Czech Republic, while the euro area saw property price growth of 7.4% (the strongest increases being recorded for Spain, France and Ireland – see the ECB's Financial Stability Report, December 2005). In the Central European region, property prices showed an increase of 5% in Hungary in 2004 (although they declined by 3.4% in 2005 – see Report on Financial Stability, March 2006, Magyar Nemzeti Bank). Poland expects an increase in property prices of around 5%-15% compared to mid-2003 (see Financial Stability Report, First Half of 2005, National Bank of Poland).

76 The relatively high growth in prices of apartment blocks in Prague is probably due to the lower share of older properties in such transfers. New apartment blocks are usually more luxurious and expensive than the existing housing stock. The increase in building plot prices in the Prague-West/ Prague-East region is related to the construction boom in these regions, which are within easy reach of Prague, and to the previous relatively low prices. On the other hand, the slower growth in building plot prices in Prague probably reflects the price growth in the pre-1998 period.

A comparison of supply prices across regions reveals an apparent price convergence trend. In 2001–2005, prices in regions with lower absolute prices rose faster on average than in regions with high prices. This link is somewhat weakened by prices in Prague, which – despite being relatively high – maintained their comparatively high growth rate. This is due to the nature of the capital city as the main administrative centre and centre of tourism in the Czech Republic, with the lowest unemployment rate etc. On the other hand, after the exclusion of Prague, and owing to the observed negative relationship between the level and growth of property prices, the price growth would lag somewhat behind in the regions with the lowest prices (Ústí nad Labem, Ostrava). This can be explained, for example, by the high unemployment in these regions. Overall, the trend towards price convergence across the regions can be viewed positively from the financial stability point of view. A more balanced price level across the regions reduces the probability of lenders making the wrong decision, reduces the risk of moral hazard and so forth.

In order to evaluate the possible existence of a property price bubble, we need to analyse the relationship between property prices, market rents and yields on other assets or the interest rate.[77] Risks to financial stability exist mainly in the case of speculative property purchases. The divergence between rents and property prices, particularly in the past two years, may pose some risk. Property supply prices in Prague increased by 3.3% between the end of 2003 and 2005, while rents fell by 6.1%. The gap between rents and property supply prices is widening in other regions, too. The "rent return"[78] in Prague has thus declined by around one percentage point, which might indicate a possible correction in property prices, especially if interest rates increase sharply.

The divergence between supply prices of flats and market rents can be well explained by movements in long-term interest rates, which have been declining since mid-2004. The difference between the "rent return" and long-term interest rates has even increased slightly since mid-2004. Moreover, there is apparently lower volatility in the "rent return" compared to long-term interest rates. In the context of the said link between price and rents, some risks stemming from the market distortion brought about by rent regulation still remain. The ratios of market to regulated rents range from around 5.5 for Karlovy Vary to 2.3 for Ostrava. In addition to an increase in regulated rents, fast rent deregulation might foster a decline in market rents. Such a decline would affect investors with a stronger speculative motive and might result in downward pressure on prices of apartments.

In addition to demand effects, supply effects might gradually start to emerge on the property market. The numbers of housing completions and starts and flats under construction are at their highest levels since the first half of the 1990s, when the previous extensive construction of prefabricated "panel" buildings was nearing completion. The ratio of all flats completed since the end of 2001 to the total housing stock this year[79] is still relatively low (3.1%). Housing construction is mainly concentrated in Prague and the Central Bohemia Region, which account for 38.5% of housing completions and 43.8% of housing starts in 2005. The share of housing starts in the number of permanent dwellings is about 2.5 times higher in these regions than in the rest of the Czech Republic.

CHART III. 23

Apartment price vs apartment price growth, 2001 – 2005

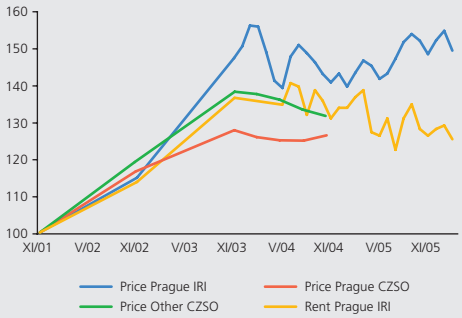
(supply prices; by regional capital; city abbreviations given in list of abbreviations)

Source: **Institute for Regional Information, CNB**

CHART III. 24

Apartment prices and rents (supply prices and transfer prices)

(November 2001=100)

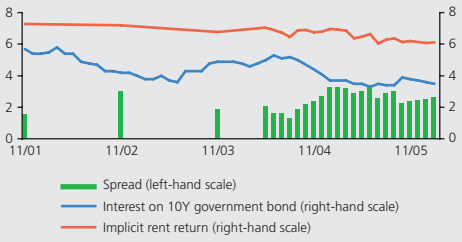


Source: **CZSO, Institute for Regional Information**

CHART III. 25

Implicit rent return vs interest rates

(left-hand scale in p.p.; right-hand scale in %)

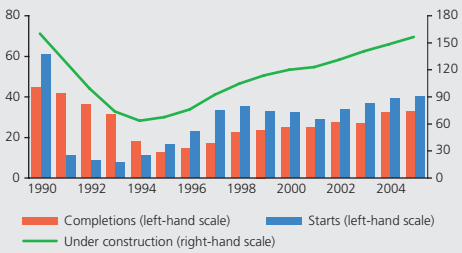


Source: **CNB, Institute for Regional Information**

CHART III. 26

Apartment construction

(numbers of starts, completions and apartments under construction in given year in thousands)



Source: **CZSO**

77 A more detailed methodological discussion was given in the box *Property Price Determinants* in the 2004 Financial Stability Report.

78 Rent return = Market monthly rent/Supply price of flat*12.
This yield does not take into account wear and tear and other costs relating to ownership of the property (repairs, charges for some services etc.) or the "credit risk" associated with the tenant's potential failure to pay. Therefore, this yield should always be higher than yields on more liquid other assets, which are not burdened with such costs or risks (bonds, for example).

79 The last census of people, houses and flats was conducted in 2001. As of that date, the housing stock consisted of 4,366,293 flats, 12.3% of which were not permanently inhabited.

4 THE FINANCIAL SECTOR

The financial sector's performance further improved in 2005 and its stability was maintained. The changes in ownership and skilled management of large banks were associated with growth in their profits. Insurance companies (life and non-life) continued to strengthen their reserves and capital for the performance of contracts and coverage of risks. The transformation of investment funds was completed. Investment companies which keep separate accounts for the administration and management of domestic open-ended mutual funds are operating on the market. Investment intermediaries headed by banks are widening the supply of investment into foreign assets and foreign funds. The stability and transparency of the market was further enhanced by a decrease in the number of investment companies and investment firms.

Concentration of activities and mergers took place in individual segments of the financial market. The financial market also recorded an increase in the scope of business and the development of services under the EU single licence principle, i.e. the recognition of a licence granted in one member state in other EU countries and thus free access to the financial market. The organisational and legal groundwork was laid for integrated supervision of financial markets and financial groups.

The improving performance and financial condition of restructured corporations and the corporate sector as a whole had a stabilising effect. In this environment, lending to corporations increased and the rapid growth in loans to households continued. Foreign investors and foreign owned financial institutions contributed to the growth in financing of households and corporations. The financial and economic links with EU countries further strengthened.

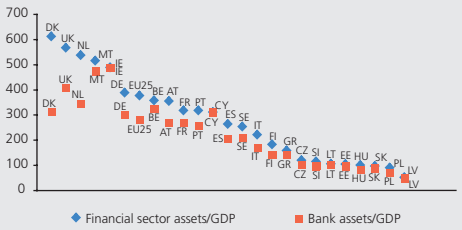
These positive trends simultaneously entail some potential risks. Faster lending growth at a time of strong economic growth may lead to growth in bad loans in the event of a subsequent economic slowdown. Asset markets, including the property market, may be negatively affected by a potential rise in interest rates. Growth in interest rates would increase the interest burden on debt incurred in previous periods and could thus complicate its due repayment. The ever increasing international integration of the Czech financial sector implies a strengthening of the sector and the transfer of necessary financial know-how. At the same time, however, new potential channels for the transmission of elements of international instability are opening up.

4.1 INTERNATIONAL COMPARISON

The relative size of the financial sector expressed as the ratio of the financial sector's total assets to GDP, referred to as the depth of financial intermediation, has been moving around 130% in the Czech Republic in the long term. The current value for 2005 (136%) reflects rapid GDP growth and a significant rise in the financial sector's assets. The depth of intermediation and the significance of the financial sector in the Czech Republic is greater than in other new EU member states, although the current level corresponds to roughly 40% of the relative size of the financial sectors in the euro area countries and the EU average.

A comparison with the advanced economies reveals the existence of potential for further development of the services of domestic financial institutions. At the same time, it implies a growing significance of maintaining the stability of banks and insurance companies, which, with their 82% share of assets in 2005, are the key players in the financial market. The Czech Republic is currently below the level of the euro area countries in lending, insurance and client investment. The volume of loans relative to GDP is up to three times lower and the total financial investment of insurance companies is one-fifth. The assets of pension scheme participants relative to GDP are approximately 30% of the relative size in the euro area. In the case of domestic investment and mutual funds the equivalent figure is under 10%.

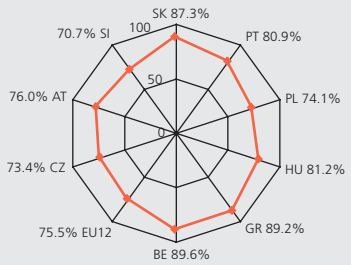
CHART IV. 1
Financial sector and bank assets in 2004
(% of GDP)



Note: High figures for LU not included. Country abbreviations given in list of abbreviations.

Source: CNB, CZSO, ECB

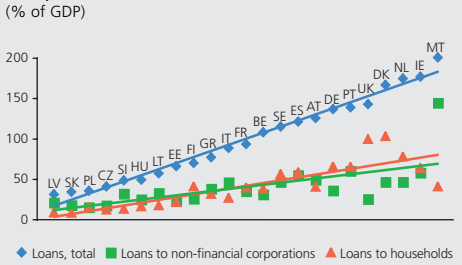
CHART IV. 2
Share of the banking sector in financial sector assets in 2004
(%)



Note.: SK excluding pension funds. Data for CZ, HU, PL, SK, SI unconsolidated. Country abbreviations given in list of abbreviations.

Source: CNB, CZSO, ECB

CHART IV. 3
Comparison of loans in 2004
(% of GDP)



Note.: Data were not available for CY. LU not included. Country abbreviations given in list of abbreviations.

Source: CNB, CZSO, ECB

As for the banking sector itself, which constitutes the core of the financial sector, the Czech Republic with its ratio of total banking sector assets to GDP of 101% (2005) remains very high by comparison with the other new member states of the EU. This is a sign of a relatively developed banking sector. The banks' 74% share in the financial sector (2005) is near the euro area average and is comparable, for example, with the levels in Poland and Austria.

A more detailed comparison reveals that the Czech Republic lags behind the advanced EU countries in some lending indicators. The share of loans to households in total loans is around half the EU figure, the share of the banking sector in loans to the government is lower and the volume of loans granted to the corporate sector is also lower. In the corporate sector, a significant role is played by alternative methods of financing, including financing from abroad, which does not show up in the domestic lending figures, and also intercompany debt, which is still not significant. Lending to households is gaining strength in the new member states of Central and Eastern Europe.

The international comparison indicates some differences in the weight of the financial sector in the Czech Republic compared to the developed EU countries but also some similarity in terms of structure. From the point of view of the theory of optimal currency areas, cross-country differences in the position and functioning of the financial sector could lead to differences in financial intermediation and monetary policy transmission and hence create conditions for asymmetric shocks. Despite its smaller weight, an efficient and flexible financial sector can effectively absorb various adverse economic shocks and eliminate their impacts on the economy. The tools for analysing the soundness of the system include macroeconomic models and stress tests assessing the resilience of the financial sector.[80]

4.2 STRUCTURE OF THE FINANCIAL SECTOR

Banks, insurance companies, pension funds, investment companies, open-ended mutual funds, credit unions, leasing companies and other financial institutions form the basic segments of the current financial structure of the Czech Republic. However, there have been some structural changes and asset transfers within this architecture. Although banking assets have risen in absolute terms over the past several years, their share in the financial sector has decreased in connection with the removal of poor-quality assets from banks' balance sheets and owing to an expansion in non-banking institutions and products. However, in 2005 the weight of banks in the financial sector increased somewhat.

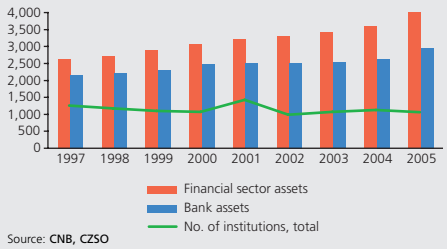
Life and annuity insurance products and pension schemes have become an attractive medium- and long-term investment opportunity for households, thanks among other things to state subsidies. Open-ended mutual fund units have also been a good investment opportunity in recent years. Leasing credit to SMEs and households was, and still is, used as an alternative to bank loans, although it no longer enjoys favourable tax conditions. Consumer credit and hire-purchase plans offered by non-banking financial and commercial institutions are competing with the products and services offered by banks.

A diversification process has also been going on in banks, which in a number of cases lead financial groups and, through their subsidiaries, exercise significant control over segments of the financial market. Within financial groups, besides activities in insurance and pension schemes, this encompasses capital market business, financial leasing and factoring. Many of these services, especially in the deposit market, but also in the loan market, are aimed at households. Banks are diversifying their assets to a larger extent, *inter alia* towards other financial institutions and intermediaries.

80 The results of the tests for banks are contained in the article *Summary of the Results of Stress Tests in Banks* in the thematic part of this Report.

CHART IV. 4

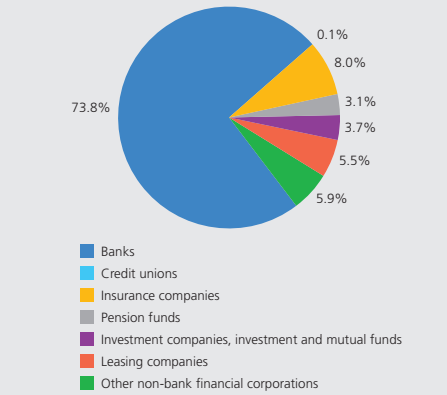
Number of institutions and volume of assets in the financial and banking sectors
(CZK billions; number)



Source: CNB, CZSO

CHART IV. 5

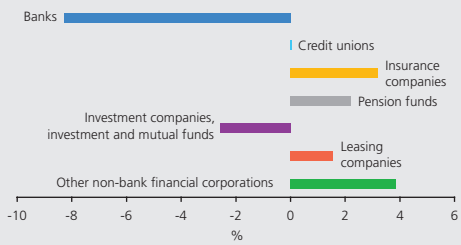
Shares in financial sector assets as of 31 December 2005
(%)



Source: CNB, CZSO

CHART IV. 6

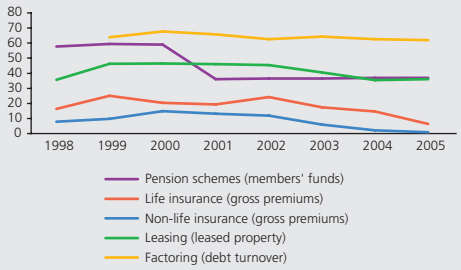
Rise/fall in share in financial sector assets, 1997 – 2005
(%)



Source: CNB, CZSO

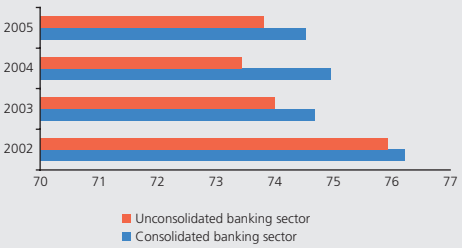
CHART IV. 7

Market shares of banking financial groups
(%)



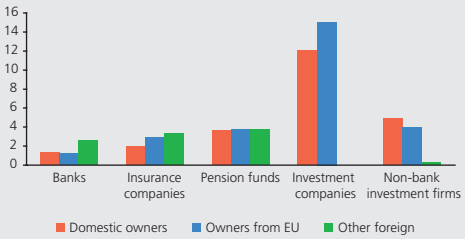
Source: CNB, APF ČR, ČAP, ČLFA

CHART IV. 8
Share of the banking sector in the financial sector
(%)



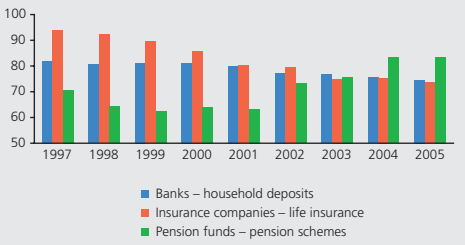
Source: CNB

CHART IV. 9
Return on assets by majority owner, 2005
(%)



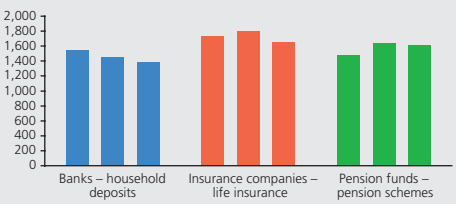
Source: CNB, MF CR

CHART IV. 10
Market shares of the five largest companies on the relevant market
(%)



Source: CNB, ČAP

CHART IV. 11
Concentration on the relevant market in 2003 – 2005
(Herfindahl index)



Source: CNB, MF CR, ČAP

In 2005, large domestic banks controlled almost 37% of the private pension market and almost 6% of the life insurance market and no longer had a major interest in the non-life insurance market. On the capital market, banks (the largest investment intermediaries) managed most of the domestic investment funds and domestic open-ended mutual funds through their subsidiary investment companies.

A characteristic feature of the current financial sector is the significant ownership and functional links between institutions in its individual segments. At the end of 2005 there were nine banking regulated consolidated groups and a significant insurance company financial group. The assets of the consolidated banking sector, i.e. including non-bank members of regulated consolidated groups, made up around 74% of the financial sector's total assets at the end of 2005. New legal forms of financial institutions and groups, in the form of holding companies and conglomerates, came into being on the Czech Republic's accession to the EU and with the gradual implementation of new legislation.[81]

Foreign owners control most of the assets of the Czech banking and insurance sectors, with 96% and 77% respectively (investors from EU countries have 91% and 72% respectively). The participation of foreign majority owners is lower, for example, in non-bank investment firms (40.4% from EU countries). Foreign control is slightly smaller in pension funds, amounting to 36% at the end of 2005 (13% from EU countries). Domestic financial institutions tend to achieve a lower return on assets from net profit than foreign owned entities or entities with owners from EU countries). Investment companies and non-bank investment firms operate with high returns. Pension funds are also relatively successful.[82]

4.3 STRUCTURE OF THE MARKET

Changes in market structure are a factor influencing the efficiency and stability of financial institutions. Large strong financial institutions now operate in many segments of the market. Thanks to their capital strength and their ability to manage risks and diversify their activities, they are able to withstand adverse pressures from the external environment. On the other hand, the concentration of financial activities into several large institutions implies a high degree of market control. Large financial institutions may pose a higher systemic risk than smaller companies. In this regard, the legislation deals, in line with developments in the EU, with the issue of supervision and a unified approach for cases of business failure. Competition should foster better quality services and cheaper products and hence motivate firms to be more efficient.

As regards the structure of the market there was a change in trend which led to a smaller number of entities in some segments of the financial market. There are 36 banks operating in the banking sector and 11 funds operating in the pension market. The number of insurance entities rose to 45 in 2005, owing to the entry of branches/organisational units of foreign insurance companies. The banking and insurance sectors saw a slight decline in concentration as measured by the share of the five largest financial institutions on the market. The pension fund sector moved in the opposite direction, recording a further rise in concentration. In spite of these mixed trends in the number of entities, the level of concentration in the relevant deposit and life insurance markets has gradually converged towards a similar market structure, with the five largest companies controlling around 74% of the market.

81 European financial institutions joined those allowed to operate in the Czech Republic, under a directive on the free provision of services (for more details see section 4.8 *International Aspects*).

82 For illustration we present a comparison of the RoA of financial institutions with the RoA from the after-tax profit of non-financial corporations (6.8%), and within them foreign owned corporations (8%). This comparison is less conformed owing to differences in objects of business and corporate indebtedness with external funds.

However, each financial industry has its specific features. For example, in banking, as well as in other sectors, efforts to acquire clients for lending transactions are visible. However, the competition is greatest on the deposit market. This is apparent in a way from the Herfindahl Index (HI), which measures the level of concentration.[83] In the banking sector the HI was 1,042 for claims on clients and 1,280 for primary deposits at the end of 2005.

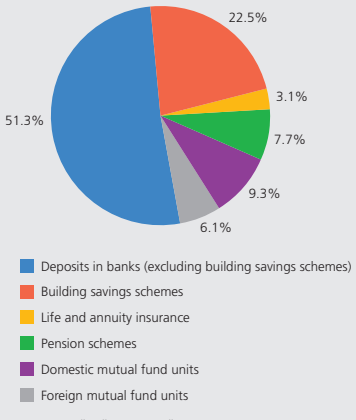
In the household deposit market, the position of the dominant banks was challenged by competition from building societies (the large banks maintained their positions through their subsidiary building societies) and from some foreign banks operating in the Czech Republic. Alternatives to this market include life and annuity insurance, private pension schemes and mutual fund units from non-banking institutions. The level of concentration is higher in insurance (HI 1,654 in 2005) and in the pension scheme market (HI 1,612) than in the banking sector (HI 1,383). The merger of two pension funds has strengthened the battle for market share and accelerated the process of concentration in the pension scheme market in the last two or three years. In the life insurance market the market shares of large insurance companies fell slightly.

Banks and other financial institutions exploit the specific features of products and specialised services relating to price and quality. These features include concentrated collection of demand deposits on current accounts by some banks, the state contribution to building savings schemes and pension schemes, the level of taxation set for interest income on deposits and mutual fund units, guaranteed returns for selected products in funds and the technical interest rate set for insurance companies. In addition to these specific product segmentation features, the aforementioned products also have one common feature – concentration of household deposits for short and long-term investment.

These specific features can affect concentration in market segments. Institutions with universal or special licences (usually banks, insurance companies and non-financial institutions) can control a relatively isolated market either directly via diversification and combination of products and services or indirectly via specialised subsidiaries. In practice, companies also make use of ownership interests in groups with a financial entity (bank holdings and other financial holdings and conglomerates). The high concentration in the case of product segmentation (for the five largest companies) is for these reasons relative and corresponds to the natural growth trend in society. On the domestic market, large banks and insurance companies are indeed exploiting their potential to control the market. Competition may be increased by the entry of branch offices with a single European licence and the entry of companies from the EU temporarily providing services on the host market.

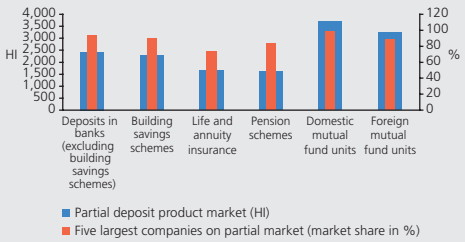
At the end of 2005 the concentration of the banking sector in total assets reached an index of 1,155 (EU average was 1,171 in 2004). During 2005, the index of concentration of the number of household current accounts with electronic and traditional access, administered by banks, declined significantly (2,574 at the end of the year). Nevertheless, the concentration of the number of current accounts is higher than that for the volumes of deposits or total assets, as this product does not figure in the range of products offered by specialised banks.

CHART IV. 12
Shares on the household deposit market
(%)



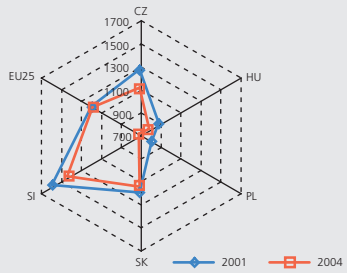
Source: CNB, MF CR, APF ČR, ČAP, AFAM ČR, AKAT

CHART IV. 13
Competition in deposit market segments (households)
(HI; %)



Source: CNB, MF CR, APF ČR, ČAP, AFAM ČR, AKAT

CHART IV. 14
Herfindahl indices for banking sector assets
(%)

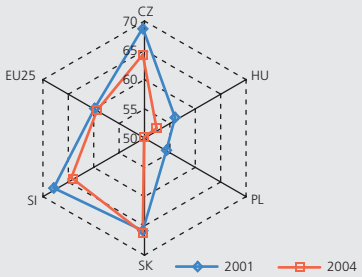


Note: Country abbreviations given in list of abbreviations.

Source: CNB, ECB

83 The Herfindahl index (HI) is the sum of the squares of the market shares of all entities operating on a given market and expresses the degree of concentration in the market. It takes values of between 0 and 1, or for better expression of values, is given in the range of 0 to 10,000. The lower the HI, the more competitive the market.

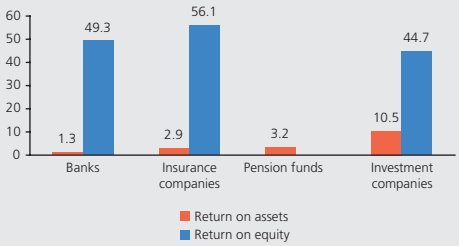
CHART IV. 15
Shares of the five largest banks in banking sector assets



Note: Country abbreviations given in list of abbreviations.

Source: CNB, ECB

CHART IV. 16
Returns by selected sectors (average 2003 – 2005)
(%)



Source: CNB, MF CR

The share of the five largest banks in total assets was 65%. In this case the figures are comparable with other European banking sectors. In 2004, the EU average was 59% of total assets. A higher concentration is typical of countries with smaller banking sectors and hence often also of the new EU member states. The degree of concentration in individual countries is also being affected by decisions on the location of headquarters of major supranational institutions and by the continuing process of market consolidation through mergers and acquisitions.

Concentration from the point of view of total assets or individual products does not tell the whole story about competition in a given country or about competition in particular products or services for a given client segment. Higher market concentration can also be a result of greater efficiency of some financial institutions, in particular better cost management and better customer targeting, which is subsequently reflected in better terms and conditions for clients. A more attractive range offered by a bank group will naturally pass through to the indicators of market concentration, even if there are far more entities competing in the given area.

Stability of the financial sector and its individual components is dependent, to some extent, on the profitability of financial institutions. Banks, insurance companies and pension funds have been successful in generating returns on invested funds over the last three years. Investment companies have participated effectively in financial intermediation. For some institutions this has been a reason for dividend payments and, in the case of foreign ownership, repatriation of earnings.

4.4 THE BANKING SECTOR

Banks can be exposed to risk factors relating both to the external environment in which they operate and to conditions inside the bank. With the development of ever more sophisticated products, services, sales channels and internal banking processes, the potential risks are being further modified and becoming increasingly interconnected. In fast developing areas of banking business, operational risk is also growing. The potential negative consequences of these factors may not only affect banks' own performance, but also lead to situations where a bank is unable to meet its obligations to various categories of trading partners.

Credit risk remains a key factor for banks in the Czech Republic, particularly in its basic form where it is associated with lending to businesses and households. Given the continuing dynamic growth of lending, leading to growth in the share of loans in banks' balance sheets, a separate section has been devoted to credit risk. Considerable attention is also devoted to market risks, with potential negative developments in the area of interest rate and foreign exchange risk having been assessed in a stress testing exercise.

Credit risk is likely to remain the most significant risk going forward owing to the growing significance of lending activities, even in a situation where loan portfolio quality is gradually approaching a level comparable with the advanced European economies. The lower exposure of banks to interest rate and foreign exchange risk, associated with the quality of management of assets and liabilities in terms of maturity and interest rates and with the long-term balance of the overall foreign exchange position amid a relatively low representation of foreign currencies in the balance sheet, is being reflected in the structure of capital requirements. The capital requirement for credit risk accounts for more than 90% of the overall capital requirement of banks in the Czech Republic.

4.4.1 Creation and Allocation of Profits

The banking sector was highly profitable for the fourth year in a row in 2005. The positive evolution of profitability continued to strengthen the stability not only of the banking sector as a whole, but also of the entire financial sector. The earnings increased the ability of banks and other financial institutions in banking groups to absorb risks by means of sufficient disposable capital. Net profit after taxation was CZK 39.4 billion, a year-on-year increase of 20%. The three largest banks together accounted for 69% of net profit. These banks' share of net profit is 13 percentage points higher than their percentage of the banking sector's total assets. Of the total of 36 banks, six were loss-making.[84]

The most important items for the resulting level of net profit are profit from financial activities, operating expenses and also, given the large loan portfolio of domestic banks, operations associated with bank loans linked particularly to their quality. Extraordinary income and expenses also contributed to profit generation in 2005.[85]

Profit from interest and fees, with shares of 59% and 29% respectively in 2005, are an increasingly important component of profit from financial activities. The share of interest and fees in the income of banking sectors in individual EU countries depends mainly on the structure of their balance sheets, i.e. on the structure of the products and services they offer. For the consolidated Czech banking sector, the share of interest profit in profit from financial activities was the smallest in the EU in 2004. This corresponds with the current small share of loans in total assets and the low interest rates. This share increased by comparison with the previous period, in parallel with an increase in the banking sector's claims.

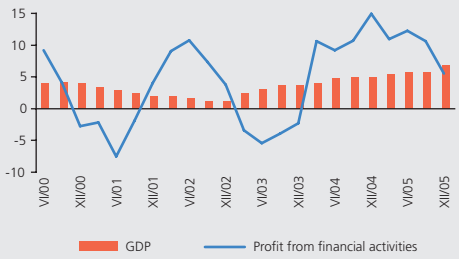
The Czech banking sector, which is the main source of financing for households and a significant source of financing for corporations, derives most of its interest profit from loans provided to these two client segments. Interest on loans to non-bank clients accounted for half of total interest income in 2005, whereas in 2004 the figure was 5 percentage points lower. The growth in this share reflects the dynamic growth in lending, which is described in section 4.4.2 *Loans and Credit Risk*. Interest from ownership of debt securities is also a significant – although in this case relatively stable – item, with a share in interest income of around 20%.

In 2005, the widely discussed issue of fees charged by banks was one of the factors leading to minimal year-on-year growth in profit from fees and commissions of 1.6% (versus 18.9% in 2004).[86] Fees charged by banks for payments make up a large part (almost 58%) of this item. The share of fees from lending activity declined for the second consecutive year to almost 19% for 2005.

In addition to the situation on the market and client creditworthiness, the competitive structure in the relevant segment plays a significant role in determining interest and fees for credit products. Banks inform potential clients not only about the interest rate on a potential loan, but also about its total price, i.e. the average annual percentage rate of charge, including all fees relating to the loan.

CHART IV. 17

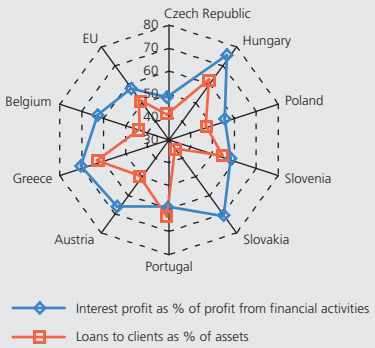
Profit from financial activities and GDP
(%; year-on-year change)



Source: **CNB, CZSO**

CHART IV. 18

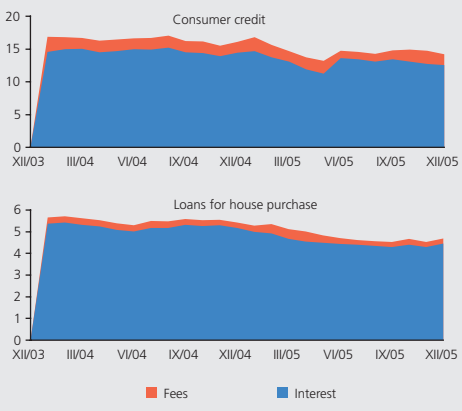
International comparison of the significance of interest-bearing assets for banks' profits and balance sheets
(%; national banking sectors are consolidated)



Source: **CNB, ECB**

CHART IV. 19

Decomposition of average annual percentage rates of charge on credit to households
(%; rates on new koruna loans)



Source: **CNB**

84 Foreign bank branches and banks with specialised activities.

85 In 2005 the profit of the banking sector was affected by extraordinary income from arbitration proceedings, the sale of ownership interests, a reduction in contribution to the Deposit Insurance Fund and dividends received.

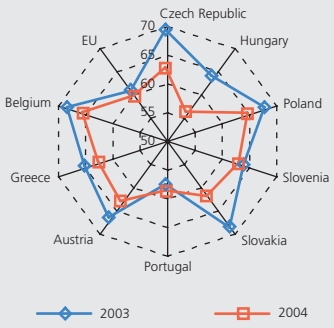
86 One-off events (extraordinary income increasing profit from fees in 2004 and accounting changes decreasing profit from fees in 2005) were other major factors leading to the appreciable year-on-year decline in fee profit growth in 2005.

The boundary between interest profit and the other components of profit from financial activities remains blurred, as domestic banks have been able to apply the effective interest rate since 2003.[87] The interest rate may thus include, fully or partially, the fee related to the given interest-bearing asset or liability. Comparisons of interest profit and profit from fees between individual banks or between individual national banking sectors thus cannot be entirely exact.

Net creation and release of provisions and reserves for claims was positive for the second consecutive year. Their net generation, related primarily to the growing volume of loans granted, thus enters banks' profit. The banking sector showed a slight year-on-year decline in non-performing loans, although concurrently it recorded a rise in watch loans, leading to an overall increase in classified loans. Portfolio loans, for which it is also necessary to create sufficient provisions, grew in 2005. The share of portfolio loans, for which banks create provisions on the basis of statistical estimates, amounted to roughly 10% of total loans at the end of 2005.

CHART IV. 20

International comparison of efficiency based on cost-income ratios
(%; national banking sectors are consolidated)



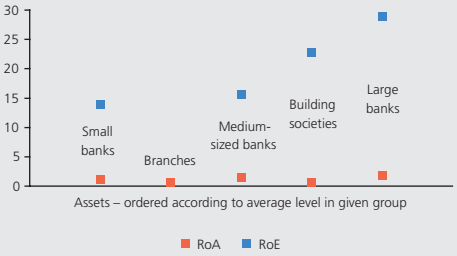
Source: CNB, ECB

The resulting profitability of banks depends largely on their ability to use their resources efficiently. The cost-income ratio (operating expenses to profit from financial activities) indicates growth in efficiency over the past period. Compared to 2003, banks succeeded in creating the same volume of the profit from financial activities using a smaller volume of costs for the second time. The Czech consolidated banking sector's cost-income ratio of 62.6% in 2004 was 3.2 percentage points above the European average. Of the CEC5 countries (the five countries of Central and Eastern Europe, i.e. the Czech Republic, Hungary, Poland, Slovakia and Slovenia) only Hungary showed better efficiency (56%). The banks operating in the Czech Republic are also achieving very good efficiency within the internationally active bank groups of which they are members. The efficiency of banks as measured by the cost-income ratio has been improving recently for most of the banking sectors in the EU.

These factors again led to high returns on assets and Tier 1[88] capital (1.4% and 25.3% respectively). Both these indicators recorded year-on-year growth in 2005. The other CEC5 countries are achieving similarly good results. By contrast, the EU average was several times lower for both indicators in 2004. The banking sectors of non-transformation EU economies did not start recovering significantly from the previous decline until 2005. For example, Greece and Portugal showed a return on Tier 1 of only just above 10% for their consolidated banking sectors in 2004. Belgium and Austria, the home countries of the owners of major banks in the Czech Republic, approached the 15% level for the same indicator. The profitability of the entire sector in the Czech Republic were driven upwards by the large bank group. A comparison of the profitability and efficiency of Czech and foreign banks connected by ownership links is contained in section 4.8 *International Aspects*.

CHART IV. 21

Return on assets and Tier1 in 2005 by bank group
(%)



Source: CNB

Banks are striving to increase their efficiency, and hence also their profitability, by strengthening their direct banking channels. As regards the volume of transactions using electronic banking channels, internet banking is in first place, with more than CZK 5.6 billion transferred in 2005, i.e. three times the 2004 figure. The volume of card transactions in the Czech Republic in 2004 was CZK 76,000 per capita, which is comparable to the euro area average and the highest figure in the CEC5 region. The value of transactions thus increased by 130% year on year. The number of ATMs relative to the total population in the Czech Republic has been rising steadily over the last four years. In 2004 it was comparable to the CEC5 countries,

87 The effective interest rate is the rate at which expected future cash flows are discounted until maturity or until the earliest date of change in the interest rate.

88 Tier 1 is 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.

but still substantially lower than the EU average (269 ATMs per million inhabitants in the Czech Republic versus 708 in the EU). Debit cards remain the most commonly used cards in the Czech Republic, but the number of credit cards is rising sharply and so lending via these instruments is rising in parallel (for more details see section 4.4.2 *Loans and Credit Risk*).

The development of electronic banking may foster growth in banks' profitability and increase convenience for clients, but it also brings new forms of risks. These include increased sensitivity to systems failure and criminal activities associated with the new technologies. Bank clients in the Czech Republic may also become the target of such activities. At the EU level, a series of measures to eliminate the factors enabling misuse of new technologies has been adopted over the last ten years. In February 2005, the Czech Republic signed the "Council of Europe Cybercrime Convention", thus joining the countries endeavouring to harmonise the legislative and regulatory environment for computer and network systems.

Profit is distributed each year on the basis of decisions taken at general meetings. In 2005, the banks and five building societies paid their shareholders dividends totalling CZK 13.6 billion. The volume of dividends was smaller than in 2004, but almost double that in 2003. The dividends represented 41.5% of the 2004 net profit and were the largest item of the profit distributed, with a share of almost 82%. Almost 60% of profits generated in 2004 remained in the banks' balance sheets. The continuing repatriation of earnings to investor countries again contributed to the current account deficit. The banking sector accounted for 17% of the total outflow of earnings abroad, i.e. a one-third smaller share than in 2004.

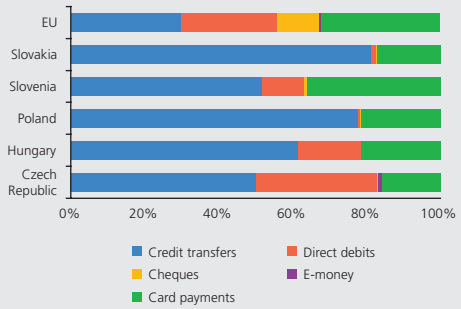
The ratio of distributed to retained profit changed in 2005 in favour of retained profit. Nevertheless, the payments of dividends and dynamic growth in lending led to a further year-on-year decline in total capital adequacy from 12.6% to 11.9% and a fall in Tier 1 capital adequacy[89] from 11.0% to 9.4%. Both ratios recorded a decline in all groups of banks. However, all banks fulfilled the regulatory minima, i.e. 8% and 4% respectively, during 2005.

Of the CEC5 countries, only Slovenia showed a lower capital adequacy for the consolidated banking sector at the end of 2004. The "old" EU countries in some cases achieved higher values (Greece and Belgium) and in other cases slightly lower values (Portugal and Austria).

The disproportion in the rate of growth of capital and the capital requirement causing the fall in the capital adequacy of banks in the Czech Republic was reflected in the stress tests results. Compared to 2004 the capital cushion needed to absorb the shocks in each scenario decreased.[90]

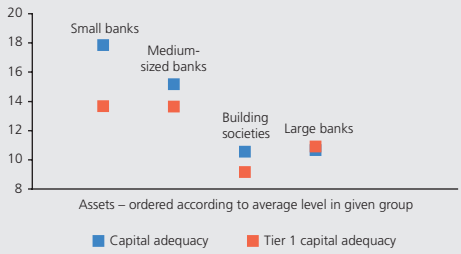
The Czech banking sector, through six representatives, was the object of Quantitative Impact Study No. 5 (QIS5). This study was proposed by the Basel Committee on Banking Supervision in order to estimate the impacts of the implementation of the EU Capital Requirements Directive, which enacts the new Basel II capital framework for the EU countries. According to the results of this study, a slight fall in capital adequacy in the Czech Republic cannot be ruled out after the directive takes effect. The expected decrease in the capital requirements for credit risk will probably not offset the new operational risk capital requirements sufficiently.[91]

CHART IV. 22
Relative importance of payment instruments in 2004
(% of total transactions)



Source: **Blue book, ECB**

CHART IV. 23
Capital adequacy and Tier1 capital adequacy in 2005 by bank group
(%)



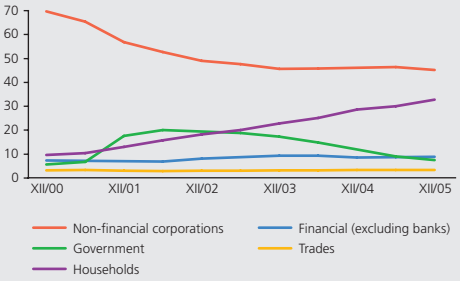
Source: **CNB**

89 Tier 1 capital adequacy is defined as the ratio of Tier 1 capital to total risk-weighted assets.

90 The results of the tests are described in detail in the article *Summary of the Results of Stress Tests in Banks* in the thematic part of this Report.

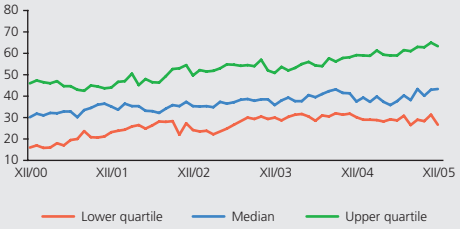
91 More detailed information on the impact study and the overall preparedness of the Czech Republic for the implementation of Basel II can be found in the publication *Banking Supervision 2005*.

CHART IV. 24
Loan structure by sector
(% of each sector in total loans)



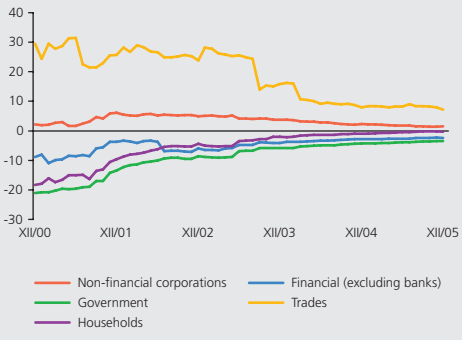
Source: CNB

CHART IV. 25
Share of claims on clients in total assets
(%; distribution)



Source: CNB

CHART IV. 26
Non-performing loans by sector
(p.p.; differences between percentage shares of non-performing loans of given sector and to clients as a whole)



Source: CNB

4.4.2 Loans and Credit Risk

Credit risk remains a significant factor of banking business from the point of view of financial stability, especially given the growing share of loans in the asset structure. If balance sheets of the largest debtors, i.e. the corporate sector and households, developed unexpectedly adversely, banks would face a rise in credit risk. On the other hand, quick assets,[92] which are the second most significant item of bank assets, represent, compared to lending, a less profitable, but safer, alternative for allocating funds. They also serve as insurance for any unexpected instant performance of liabilities.

Lending by banks operating in the Czech Republic totalled CZK 1,179 billion at the end of 2005. The ratio of bank loans to GDP, after declining slightly in 2004, rose by 3.7 percentage points to 40.2% in 2005. Total bank lending is higher than in some neighbouring countries (by roughly 4 percentage points as a percentage of GDP compared to Poland or Slovakia for 2004), but is still below the EU level (see also section 4.1 *International Comparison*). Compared to Western European economies the growth potential is substantial. The government sector is the only one whose direct debt to banks in the Czech Republic declined in 2005. Banks focused particularly intensively on the household sector.

At the end of 2005, loans accounted for 38.7% of total assets, a year-on-year increase of 1.6 percentage points. Households and the corporate sector were the main contributors to the rise (57% and 39% respectively). The growth in loans of 16.7% in 2005 represents a year-on-year acceleration of more than 10 percentage points and corresponds to the favourable macroeconomic figures. The average ratio of loans to total assets in the banking sector was not the only indicator to rise in the past period. Growth in claims on clients in balance sheets was visible across the whole spectrum of Czech banks. This is evidenced by a long-term rise in the median of the share of claims in total assets of banks (of 13 percentage points over the last five years), which has been accompanied by growth in the lower and upper quartiles.

Non-performing client loans amounted to 4.1% of the total loans of the banking sector provided to non-bank clients at the end of 2005. They decreased by 0.8 percentage point year on year. Non-performing loans also fell slightly in absolute terms. A trend of convergence in the quality of loans is visible across economic sectors, while quality improved continuously in all cases in 2005. Loans to small businesses and non-financial corporations have been recording below-average results.

Credit risk was also assessed using a macroeconomic model, and the effect of a shock worsening in loan quality on overall capital adequacy was subsequently tested. The results of the model and the testing[93] demonstrated the robustness of the system and the adequacy of the reserves of disposable capital of the banking sector as a whole. In some cases, however, banks or bank groups are reaching their limits in terms of risk management. Any losses arising from the existing reduced quality of part of the loan portfolio were fully covered by provisions and collateral for the sector as a whole at the end of 2005. In terms of provisioning, growth in loan quality positively affects the resulting profit. The ratio of non-performing loans provided by the banks in the Czech Republic was slightly higher than the European average in 2004.[94]

92 Quick assets are readily available to cover the bank's liabilities. They consist of cash, deposits and loans with the CNB, current accounts with other banks, term claims on other banks of up to 24 hours, general government zero-coupon and coupon bonds and CNB bills.

93 The results of the model and the testing are given in the articles *Macroeconomic Credit Risk Model* and *Summary of the Results of Stress Tests in Banks* in the thematic part of this Report.

94 The comparison with the EU average of 2.7% in 2004 should be viewed only as a guide, as loan quality monitoring methods are not the same in all EU states.

Loans to non-financial corporations

As regards economic sectors, the corporate sector was the biggest debtor of banks at the end of 2005, with a 44.6% share in bank loans to clients.[95]

The average year-on-year rate of growth was 2.5% between 2002 and 2004. Growth in loans to corporations swung into positive figures in 2003 H2. This rate of growth is below the euro area average and also below the average level in the EU as a whole. Among the new Central European member states, Slovakia and Poland recorded lower growth in loans. The Czech Republic, with a ratio of loans to corporations of almost 18% of GDP was in the lower half of the EU rankings in 2004 (see also section 4.1 *International Comparison*). In 2005, there was a sharp pick-up in growth in lending to the Czech corporate sector, which, with 14.3%, exceeded the growth in the previous two years by almost 7 points.

With a Herfindahl index of 1,114, loans to non-financial corporations represent the least concentrated market among the economic sectors. The five largest banks accounted for 63% of the loans at the end of 2005, which is 3 percentage points less than for the household sector. Competition in the corporate loan segment is fierce. In the current economic growth phase, banks are increasingly willing to expand their financing of the corporate sector and thus share in the expected profits. The possibility for new players to enter the lending market is an equally significant criterion for assessing competition. This possibility remains open in the Czech Republic.

Besides a sufficiently competitive environment guaranteeing credit products of high quality and reasonable prices, foreign exchange management, liquidity management and interest rate risk management are also important for the corporate sector. These types of risks, including loan quality, are also relevant for the banking sector, given the size of its credit exposure to corporations. From the financial stability point of view, they can affect the resilience of the banking system to possible individual shocks (interest and exchange rate shocks and changes in quality).

Czech corporations have intensified their relations with other countries since the Czech Republic's accession to the EU. In the event of adverse developments, and where it is not hedged, the foreign exchange risk exposure of Czech exporters and importers could be partially transferred to creditors, i.e. banks. On the other hand, we should point out that the ratio of foreign currency loans provided to corporations in the Czech Republic (roughly one-fifth of total loans to corporations) is significantly lower than in some other countries. Many exporters are "naturally" hedged against exchange rate movements by exports to the euro area.

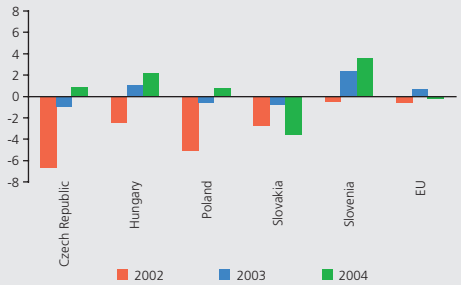
Roughly 40% of loans to corporations are provided with maturities of up to one year and approximately one-third with maturities of over 5 years. The smallest proportion is for maturities of 1–5 years. The maturity structure is partly reflected in rate fixation periods. On average, 46% of total new loans were bank overdrafts and similar loans and the same percentage had variable rates or fixations of up to one year. The share of fixations of over five years rose in 2005 from roughly 1% of newly drawn loans in January to almost 6% in December. Corporations are thus adapting to market changes more flexibly than households (see section 4.4.2 *Loans and Credit Risk – Loans to households*).

In all, 68% of the loans of banks operating in the Czech Republic go to the corporations owned by private Czech capital. This share is higher than would correspond to the ownership structure of corporations operating in the Czech Republic.[96] Foreign owned corporations in some cases draw loans directly in their owner's country.

CHART IV. 27

Year-on-year changes in credit to non-financial corporations as a percentage of GDP

(p.p.)

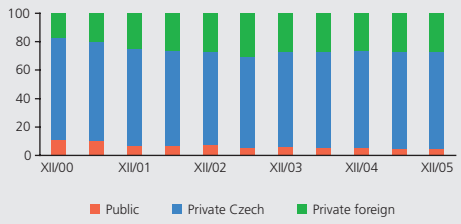


Source: CNB, ECB

CHART IV. 28

Structure of credit to non-financial corporations by ownership

(%)

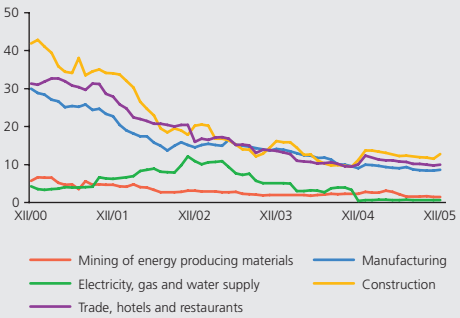


Source: CNB

95 Bank loans are the third biggest source of financing for the corporate sector in the Czech Republic, behind trade receivables and loans from abroad.

96 Roughly half of companies with 100 employees or more are foreign owned.

CHART IV. 29
Non-performing loans by industry
(% of total loans of given industry)



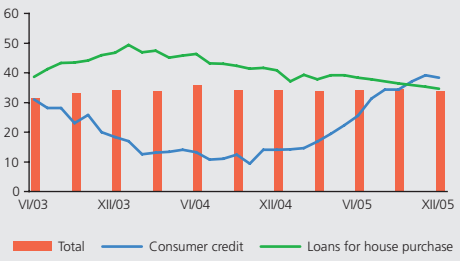
Source: CNB

The quality of loans to the corporate sector is gradually improving. Non-performing loans accounted for 5.1% of total loans provided to firms, a year-on-year decline of 1.5 percentage points. However, the corporate sector is highly heterogeneous with regard to both area of business and ownership. As regards industry, producers and distributors of electricity, gas and water are the highest quality bank debtors, with less than 0.3% of non-performing loans. Manufacturing, construction, trade and hotels and restaurants ranged between 8% and 13% during 2005, but these levels were down markedly from 2000. Seasonal industries, for example construction, also show fluctuations in quality over the year.

With a share of less than 2% of non-performing loans, foreign owned companies repay their liabilities to banks with substantially better payment discipline than Czech entities. This is consistent with the results of the analysis of foreign owned corporations in section 3.1 *Non-financial corporations*, according to which foreign owned corporations are more resilient. The corresponding figures for public corporations and Czech private corporations were around 8% of non-performing loans at the end of 2005.

The Central Register of Credits (CRC) operated by the Czech National Bank contributes significantly to the financial stability of the banking sector with regard to corporate financing. Banks can access information on the credit burden of existing and potential clients and can thus better manage their loan portfolio risks. The CRC, which contains information on legal entities and sole traders,[97] has been in operation since October 2002. All banks operating in the Czech Republic are obliged to send information to the register on a monthly basis. This information remains in the register for ten years following repayment of the debt. As of 31 December 2005, the register contained 302,799 clients with an active or already repaid debt. During 2005, commercial banks submitted credit enquiries for 201,580 clients, or 67% of all clients in the register. In addition to commercial banks' enquiries on the credit burdens of their own clients, the register is also used for acquiring information on potential clients. This is confirmed by the 48,169 enquiries made regarding clients that were not found. These statistics indicate intensive use of the register by commercial banks. A module currently is being finished which will allow analyses of aggregate data in the CRC database. This will be a valuable data source for the central bank and for commercial bank analysts, who will be able to use it to better monitor the banking sector's financial stability.

CHART IV. 30
Credit to households
(%; year-on-year change)



Source: CNB

Loans to households

Loans to households are the fastest growing item of domestic banks' assets. Their growth rate has risen by 11.6 percentage points over the last five years, reaching 34%[98] in 2005. With total liabilities to banks totalling CZK 380 billion, households were the second biggest debtor of banks at the end of 2005, behind the corporate sector. Interest charged to households is, together with the relevant fees, becoming a significant item of banks' profits (see section 4.4.1 *Creation and Allocation of Profits*). The fast growth in lending to households is at the same time significantly increasing the requirements for bank capital formation, i.e. the cushion to cover credit risk. The growth in lending, if it is not accompanied by sufficient creation of profit left in the bank and entering its capital, may lead to a further decline in capital adequacy. Some other EU countries are experiencing similar trend.

97 Information on household debtors and their debts is contained in a Banking Client Information Register operated by a private company.

98 These growth rates relate to outstanding amounts.

The rate of growth of loans for house purchase was 34.1% in 2005. The growth in traditional housing mortgages and building society loans slowed somewhat during the year. Mortgage loans were the most important component of the growth in total loans for housing purposes. The overall rate of growth of household loans was, in addition to loans for house purchase, driven by consumer credit. This rose by 37.8% compared to the end of 2004, the highest rate of growth in two years.

Loans for house purchase played the key role in the structure of loans to households in December 2005, accounting for 70% (the EU average in 2004 was 70%). Consumer loans accounted for 25%. The main factors supporting the growth in loans to households in 2005 remained the persisting low interest rates, rising incomes and overall easier access to credit, linked not only with demand possibilities, but also with the supply side. In addition to the further growth in traditional mortgage loans and building society loans, banks were successful in providing American mortgages and card credit.

Despite its current buoyant growth, bank loans to households per capita in the Czech Republic are only roughly 10% of the EU average, as in some other new member states. A comparison with GDP provides evidence for further room for growth. In 2004, the Czech Republic, with a 12% depth of intermediation on the household loans market, was at a level comparable to the other new Central European countries, while the European average was 57%. Since household incomes in the original member states are higher, household borrowers have enough funds to repay loans which are several times higher. Even relatively large loans for financing housing needs are, compared to the Czech Republic, more accessible to a wider circle of potential interested parties. As the income of households in the Czech Republic rises, further growth in the number of those interested in bank loans and gradual convergence of the average loan amount to the usual level in the EU can be expected. Developments in residential property prices, described in section 3.3 *Property Prices*, are also coming into play.

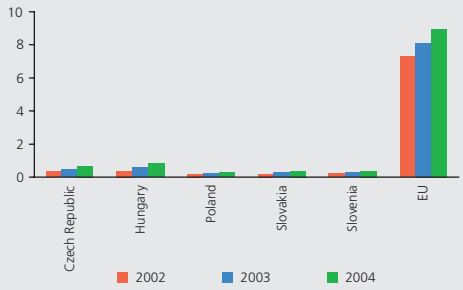
Loan to value (LTV), i.e. the ratio of the loan obtained to the value of the pledged real estate; interest rate fixation; loan maturity; and currency are important in the case of loans for house purchase from the financial stability point of view. The proportion of household loans in foreign currencies was less than 0.2% of total loans in December 2005 and so does not pose a major risk.

In the same period, the LTV ratio was 55% for the average traditional mortgage for housing purposes. This ratio indicates that the banking sector is relatively resilient to credit risk and, at the same time, has a sufficient reserve in security from the point of view of property price movements. As is apparent from section 3.3 *Property Prices*, the current level of real estate security can also be viewed as sufficient in terms of the price level on the residential property market.

Average annual interest rates on loans for property purchase dropped from 5.9% to 5.2% during the year. The most frequent time band for the fixation of new loans for house purchase in 2005 was 1–5 years. In 2005 bank clients decided to fix interest rates for this period for more than 40% of loans. Households chose fixations of over ten years for one-quarter of new loans. Some clients thus decided to stabilise their regular instalments and at the same time take advantage of the relatively low interest rates. However, clients pay a higher price for this certainty compared to shorter-term fixations and, except for building society loans, they usually lose the option of penalty-free early repayment. More than 95% of loans for house purchase were long-term loans with maturities exceeding 5 years at the end of 2005.

CHART IV. 31

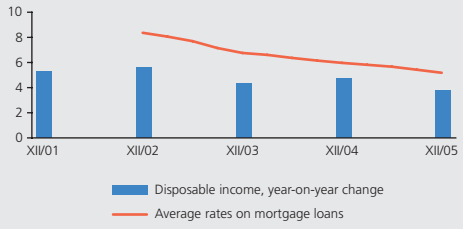
Loans to households for house purchase per capita
(EUR thousands)



Source: **CNB, ECB**

CHART IV. 32

Factors affecting mortgage lending
(%)



Source: **CNB**

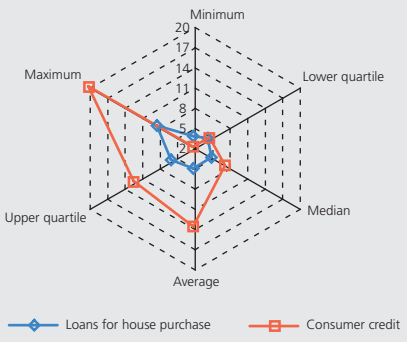
In 2005, the concentration on the housing loan market, as expressed by the Herfindahl index, was up by a negligible 47 to 1,301. The five largest banking providers of house purchase loans remained unchanged from 2004, with a 73% market share. They include banks – providing financing to households via mortgages – and building societies. The level of concentration suggests a relatively healthy competitive environment.

The interest rate and its fixation, which, together with the duration of loan, can in the medium term affect the quality of this bank asset item and the financial situation of households, are of key importance for consumer loans. As in the case of loans for house purchase, rate fixation plays a significant role in the management of interest rate risk by banks.

CHART IV. 33

Rates on koruna credit to households as of 31 December 2005

(%; average levels of individual banks on outstanding amounts of credit as of given date)



Source: CNB

The interest rate on consumer credit fell by 1 percentage point on average to 13.9% in 2005. Compared to loans for house purchase, consumer credit is usually more expensive, as it reflects the higher risk profile of such assets. There are marked differences between the rates of individual banks. The rates reflect various types of consumer credit and the rate fixation period and, no less importantly, are one of the instruments enabling a bank to acquire its desired market share. At the end of 2005, the Herfindahl index of concentration for consumer credit amounted to 2,648, which represents roughly double the concentration compared to loans for house purchase. The level of concentration is mutually conditional on the prices of consumer credit, whose range is much wider compared to the less concentrated housing loan market. When assessing concentration, we have to take into account the aforementioned factors such as the openness of the market to the entry of new competitors and higher efficiency of some entities facilitating lower prices. The spectrum of products in this area and sufficient client awareness are also important.

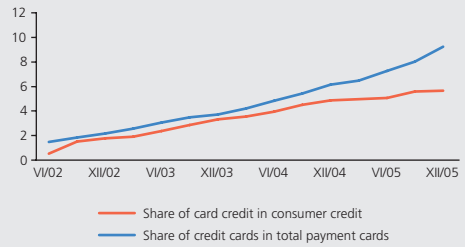
The individual banks' average interest rates on consumer credit lay within a range of 18 percentage points at the end of 2005. Banks usually charge the lowest rates for American mortgages, which are fully secured by high quality collateral. Conversely, card credit – which offers clients a high degree of convenience and flexibility – can be more expensive.

70% of the consumer credit in 2005 was provided with a floating rate or a fixed rate for up to one year. The rate fixation period generally reflects the lower amounts of consumer credit compared to loans for house purchase and the average shorter maturities of this credit. Long-term credit, which more than doubled in volume, rose sharply in 2005. At the end of 2005, the long-term category contained 53% of the credit and the medium-term category 37%, whereas a year earlier the ratio was the reverse. The growth in consumer credit maturity may be associated in particular with the abolition of tax allowances for leasing as an alternative to bank loans. Uncertainty among bank clients regarding the future evolution of interest rates contributed to the increase in loans with longer maturity. The time structure also changed partly as a result of the development of American mortgages.

American mortgages, which banks can provide under Act No. 190/2004 Coll., on Bonds, extended the range of bank loans available for purposes other than house purchase. At the end of 2005, 17 banks were providing this type of credit. The total volume was CZK 4.1 billion, CZK 1.8 billion of which was consumer credit. The share of consumer mortgage loans in total consumer credit remains below 2%. Compared to other types of loans for non-housing purposes, American mortgages, given their full coverage by a pledge, are a less risky investment for banks. Banks reflect this in lower prices for such loans. This gives clients access to relatively high loans with lower interest rates. The property pledge, which sometimes considerably exceeds the loan, can be a disadvantage for the client. This property then cannot be used if the client needs to obtain another large loan. The LTV ratio for American mortgages was 47% on average at the end of 2005, which, as with mortgages for housing purposes, represents a high degree of protection of banks in cases of default or negative developments in property prices.

Credit card credit is another expanding form of consumer credit. The volume of credit drawn through cards amounted to 5.5% of total consumer credit at the end of 2005. The rate of growth of such credit (61% in 2005) is not fully keeping pace with the growth in the number of these cards, although it converged on it considerably compared to 2004. 632,000 bank credit cards were in circulation at the end of 2005, and more had been issued to clients of non-banking financial institutions. Credit cards are gradually ceasing to be an exclusive affair for the soundest clients. Nevertheless, with a share of 5.1% of non-performing loans, the quality of card credit is substantially better than that of average consumer credit. Credit cards, which seven banks were offering to clients at the end of 2005, and payment cards generally are becoming an increasingly significant distribution channel for banking services. The volume of payment card transactions as a percentage of GDP is rising considerably in the Czech Republic (28% in 2004). The high rate of growth is due to the low initial level. Once it converges to the level in Western European countries, a considerable slowdown can be expected.

CHART IV. 34
Credit cards and credit obtained with them
(%)

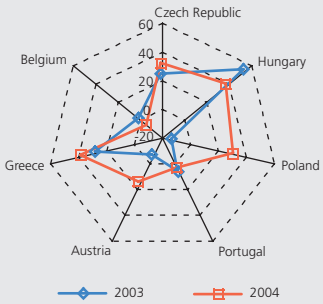


Source: CNB

The quality of household loans remained at a comparable level to December 2004 at the end of 2005, with non-performing loans accounting for 3.3% of the total. Loans to households are thus still the highest-quality loan portfolio item, mainly due to a high share of loans for house purchase, where the motivation to meet the repayment schedule is very high. Only 1.6% of total loans for house purchase showed repayment problems at the end of 2005. From the financial stability point of view, this is currently one of the less risky loan portfolio items.

The appreciable growth in consumer credit and the marked lengthening of its average maturity deserve attention. A prerequisite for timely and full repayment is expected sufficient income of the borrower, since such credit does not usually have high quality security. Any worsening of the income situation of households may jeopardise the financial condition of families and of creditor banks. Non-performing loans accounted for 7.8% of total banking consumer credit at the end of 2005. Given the fast growth in volume and the growing maturity of household loans and the fact that new loans are usually assigned the highest quality rating, the share of high-risk loans may be underestimated in the longer term.

CHART IV. 35
International comparison of consumer credit growth
(%)



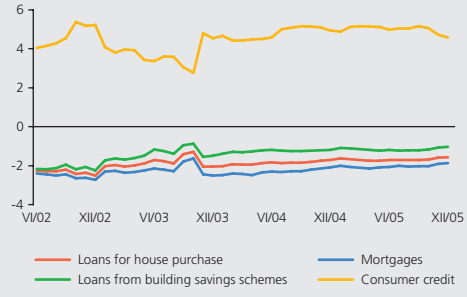
Source: CNB, ECB

The evolution of consumer credit to households within individual EU countries in the past period showed a mixed picture. The growth or decline in 2003 and 2004 was influenced by the overall situation in each particular economy and by the level of saturation of the relevant markets. Going forward, these two key factors will have a significant effect not only on the provision of consumer credit, but also on its quality.

The partial uncertainty regarding the future development of household loans in the Czech Republic stemming from the current buoyant growth in consumer credit is multiplied by the growing practice of banks, which to an increasing extent have ceased to classify individual loans. Portfolio loans whose quality is not exactly known rose from 1% to more than 25% of total household loans during 2005. Where necessary, banks are required to create sufficient provisions for these loans.

Households are also running up debt to an ever-increasing extent with non-banking institutions, which, like banks, share basic information on debtors and their debts. A bank register of household loans has recently become a significant aid to banks when deciding whether to provide new loans and hence also a tool for reducing credit risk. The Banking Client Information Register was being used by 18 banks at the end of 2005.

CHART IV. 36
Non-performing loans to households by purpose
(p.p.; differences between percentage shares of non-performing loans of given purpose and to households as a whole)



Source: CNB

4.4.3 Sources of Asset Financing

The manner of financing assets affects a bank's ability to respond to possible unfavourable developments and can be decisive as regards the sector's resilience to potential shocks. From the financial stability point of view, therefore, it is desirable to conduct a more detailed analysis of the various aspects and factors associated with bank financing. The commonest forms of external funds used by banks in

the Czech Republic are client deposits, financing on the interbank market and the issuance of debt securities.

Roughly 87% of the banking sector's assets were financed by external funds on average in 2005. The equivalent ratio for foreign bank branches and building societies is still about 10% higher. The liabilities of banks to non-bank clients are far and away the most important item of external funds. However, the banking sector is not homogeneous. For some institutions, financing on the interbank market plays the primary role, whereas for others issuance of debt securities is the most important. Subordinated liabilities, with a share of less than 1% of the balance sheet, play a negligible role. This situation has been broadly stable for several years and the behaviour of other market participants is creating a readable environment for banks operating in the Czech Republic. Building societies are in a specific situation, as their financing is based on conditions laid down in the legislation.

The total primary deposits of banks have long been roughly 1.7 times total bank loans. Each economic sector plays a different role in relation to banks. Households and trades are long-term net contributors to bank loans, which go primarily to non-financial corporations. Manufacturing remains the biggest loan recipient, followed by trade, hotels and restaurants and producers and distributors of electricity, gas and water.

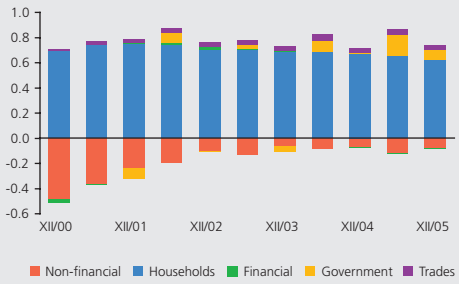
The sufficiency of coverage of bank loans by primary deposits is currently facing two main challenges. The persisting low interest rate environment and the flat yield curve are eliminating the differences in remuneration between short-term and longer-term client deposits and thus significantly affecting the ratio of demand deposits to time deposits. This ratio was 1:1 at the end of 2005. Loans with maturity longer than one year accounted for 75% of total loans provided by banks as of the same date. Sight deposits can be considered potentially less stable from banks' point of view, as no penalty is imposed on clients for immediate withdrawal of their funds. The flat yield curve and low interest rates are simultaneously fostering growth in preferences for long-term loans with fixed rates. The second challenge is gradual growth in households' liking for investing in life insurance and pension schemes and capital market products. These forms of savings and investment return only partially to bank accounts in the Czech Republic in the form of deposits by non-banking financial institutions.

Foreign bank branches and some medium-sized banks that lack sufficient client deposits finance themselves through the interbank market. Thanks to the reputations of their foreign owners, these banks usually have easy access to advantageous sources from other banks. In the last five years, foreign bank branches have obtained on average almost 60% of their external funds on the interbank market, often from non-resident banks. The excess of asset or liability exposures from interbank relations can be assessed using the interbank ratio (claims/liabilities from the interbank market). A value close to 1 indicates a bank whose claims and liabilities vis-à-vis other banks are balanced.

The risk of interbank contagion was subject to stress testing. The banking sector proved to be sufficiently resilient in this testing exercise.[99]

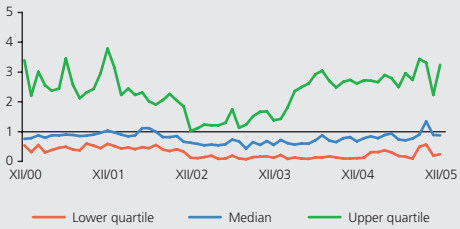
The significance of financing through debt securities issues is growing as mortgage banking develops. A total of 19 banks were partially financed in this manner at the end of 2005. Ten banks took advantage of the possibility of financing mortgages through mortgage bonds. The funds acquired in this manner amounted to CZK 120 billion and were used to cover 46% of mortgages, most of which were provided for housing purposes.

CHART IV. 37
Net positions of sectors vis-à-vis banks
(CZK trillions; deposits at banks – bank loans)



Source: CNB

CHART IV. 38
Distribution of interbank ratios
(receivables/liabilities from interbank transactions; excluding building societies)



Source: CNB

99 The results of these tests can be found in the article *Summary of the Results of Stress Tests in Banks* in the thematic part of this Report.

The time matching of assets and liabilities with maturities of up to three months and also in longer time bands was very good. This provides banks with good protection against liquidity shocks. Sufficient banking sector liquidity, as expressed by the share of quick assets in total assets, ensures sufficient protection of banks in the event of any early fulfilment of the liabilities of banks.

EU accession did not affect the volume of foreign currency transactions of the banks operating in the Czech Republic. Their share remains at 16%-20% of asset and liability exposures in the balance sheet, i.e. at the pre-accession level. Medium-sized banks show greater foreign exchange liabilities, whereas high volatility is typical of the position of foreign bank branches. This is largely consistent with the positions of the individual bank groups vis-à-vis non-residents given in section 4.8 *International Aspects*. The US dollar, the euro, the pound sterling and the Slovak koruna were the most frequently used currencies in the foreign currency transactions of Czech banks in 2005.

The Czech banking sector as a whole is not exposed to significant foreign exchange risk. The overall foreign exchange position is almost balanced on a long-term basis. The limits set for open currency positions, whose purpose is to minimise any negative impacts related to foreign exchange risk, are not fully used by most of the banks at present. In the majority of banks the limits are substantially higher than the actual drawdown. In a stress test, a shock to the exchange rate was modelled in several scenarios. The results of the stress test did not indicate any major foreign exchange risk for the banking sector as a whole. The banking sector is exposed to indirect foreign exchange risk primarily through loans to the corporate sector. In the case of unhedged foreign currency transactions by such businesses, their foreign exchange risk may be transformed to a potential worsening of the quality of their loans. The current loan quality level does not signal any such trend.

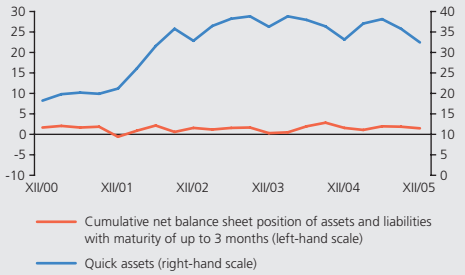
4.4.4 Interbank Relations

International and domestic experience indicates the need to monitor financial soundness ratios, early warning signals and other indicators describing the functioning of the financial system and the banking sector. The system of such instruments includes the development of prudential rules for banks, the monitoring of interbank market activities and the development of methodologies for stress tests and other tools for managing credit risk and market risks, including supervisory data and reports.

Consequences of the insufficiently restructured economy emerged in the Czech banking sector in the late 1990s. Banks were also subject to a foreign exchange crisis. Small failing banks left the market and the privatisation of large banks was completed. Some stress test scenarios are based on historical shocks and the developments of 1997–1999 and take into account the risk of interbank contagion.

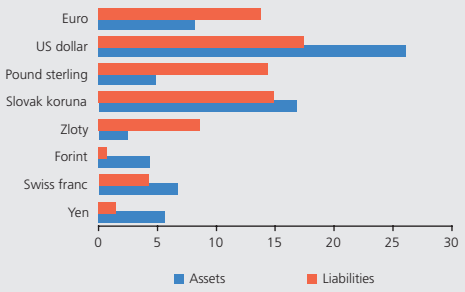
Data from reports on the significant exposures in banks' portfolios provide information on more than 70% of total loans and deposits between banks. These comprise claims (in particular credit and loans granted) and liabilities (loans and deposits accepted) on the interbank market. The difference between total claims from gross exposure (assets) and total liabilities in a given year is due to different methodologies.[100]

CHART IV. 39
Cumulative net balance sheet position and quick assets
(% of total assets)



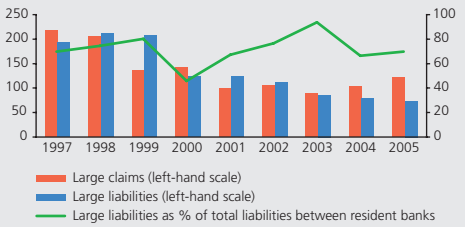
Source: **CNB**

CHART IV. 40
Foreign exchange transactions
(% of total transactions in foreign exchange market currencies; 2005 average)



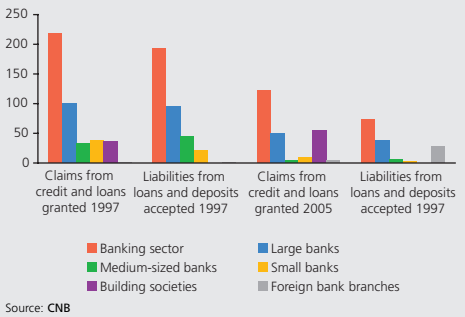
Source: **CNB**

CHART IV. 41
Significant exposures of banks on the interbank market
(CZK billions; %)



Source: **CNB**

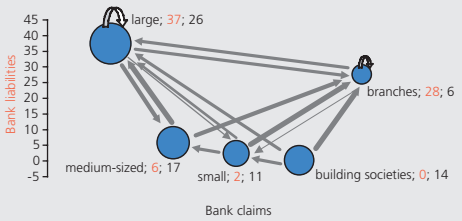
CHART IV. 42
Significant interbank exposures in 1997 and 2005
(CZK billions)



Source: **CNB**

100 In their reports banks declare in their assets claims on all debtors with a gross exposure of 10% or more of the capital of the bank and in liabilities over-limit deposits and loans received exceeding 1% of total assets or CZK 100 million.

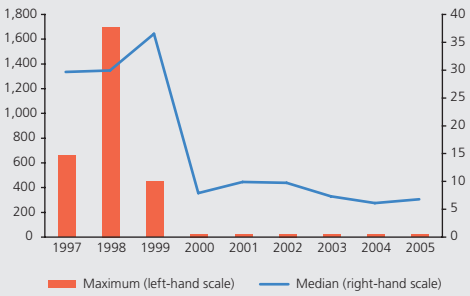
CHART IV. 43
Intensity of interbank exposures in 2005
(CZK billions)



Note: Claims and liabilities comprise loans and deposits of more than CZK 100 million or more than 1% of the total assets of the creditor resident bank. The arrows indicate the direction and intensity of the relationships, including those in the group of banks and branches.

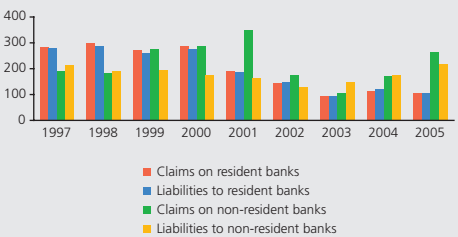
Source: CNB

CHART IV. 44
Net exposure from the largest exposure as a percentage of banks' capital
(%)



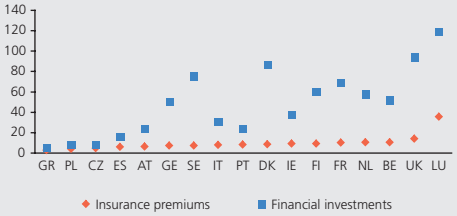
Source: CNB

CHART IV. 45
Claims and liabilities vis-a-vis non-resident banks from banks' balance sheet
(CZK billions)



Source: CNB

CHART IV. 46
Insurance premiums and financial investments in selected EU countries
(% of GDP)



Note: Country abbreviations given in list of abbreviations.

Source: CNB, CZSO, CEA

The data reveal that the credit exposure of resident banks on the interbank market is roughly half of that in 1997. Interbank exposure fell significantly after 1999 in connection with consolidation of the banking sector (*inter alia* through the transfer of bad debts to a consolidation agency). The lower level of interbank exposures increases the banking sector's resilience to interbank contagion risk. This was confirmed by stress tests that consider the possibility of bank failures and the ability to cover outstanding claims with capital.

Large banks provided, and still provide, the most credit and loans to other banks. The large banks also maintain large exposures between themselves and are also the largest recipients of loans and deposits on the market. Building societies place significant funds on the interbank market and are, as a rule, in a net creditor position. For example, at the end of 2005 they provided credit to the tune of CZK 14 billion, CZK 3 billion of which was to large banks, CZK 3 billion to medium-sized banks and CZK 8 billion to foreign bank branches. Medium-seized banks have strong links to large banks, while small banks have larger exposures to branches. Foreign bank branches usually receive loans and deposits.

Some credit exposures, as measured by capital requirement to net exposure vis-à-vis all debtor banks, were higher in 1997 and 1998. The change in the required capital coverage of interbank exposures was associated with a change in the capital adequacy rules in 2000. At present, the exposure of resident banks is considerably lower, and credit and loans are under 25% of the permitted ratio of net credit exposure to bank capital for the largest exposure to other banks. The potential negative impact of the largest credit exposures on the capital of a creditor bank in the event of default by a debtor bank is contained in the interbank contagion stress tests.

Exposure to non-resident banks is increasing. Banks are locating their assets on the foreign interbank market and their claims (and also liabilities) vis-à-vis their parent banks are growing. Banks provided 2.5 times the volume of cross-border loans and time deposits compared to the domestic interbank market activities at the end of 2005. Domestic banks are exposed in particular to (parent) Austrian, German, French and Dutch banks or their banking financial groups. The significance of these activities is leading to the development of co-operation with home country supervisory authorities and methods for monitoring exposures abroad in relation to the financial soundness of partner and parent banks.

4.5 INSURANCE COMPANIES

Besides specialised life and non-life insurance companies, universal insurance companies with separate accounts for life insurance and non-life insurance operate on the domestic insurance market. Of the total number of 45 insurance companies in 2005, 21 non-life insurance companies, 5 life insurance companies and 19 universal companies were operating on the market.

The insurance market grew more slowly than in the previous period, especially in the life insurance segment. Medium-term policies with single premium payments, which insurance companies offered in the period of high interest rates in the late 1990s, were terminated. The reassessment of non-life insurance policies in the light of the increasingly volatile climate and the need to increase technical reserves was a major factor behind the growth in premiums in past years. Overall, premiums written have doubled since 1999.

The growth potential of the insurance market is apparent from an international comparison of total premiums written to GDP. In 2005, this ratio was 4% on the Czech market, roughly half the average for the EU-25 and lower than in some new member states. Financial investments of domestic insurance companies (allocation of funds) reached 8.5% of GDP, one-fifth of the European average. As

regards the amounts of premiums written and financial investment in euros, the Czech insurance market ranks seventeenth among the 25 EU countries.

Significant long-term funds have been accumulated in developed countries with a tradition of life insurance. The ratio of financial investment from life insurance to investment from non-life insurance was 440% in 2004 in the developed countries (versus 202% in the Czech Republic at the end of 2005). The ratio of life insurance premiums to non-life insurance premiums was 154% (62% in the Czech Republic). Domestic insurance companies thus have potential for developing life insurance services and products, although this potential is limited by the competition on the household deposit market.

As regards the structure of the Czech insurance sector, 20 foreign owned entities are active on the market, 17 of which are owned by EU companies. Insurance companies with a registered office in an EU member state may carry on business under the freedom to provide services (as at the end of 2005, a total of 322 foreign insurance companies from EU countries had announced their intention to provide services in the Czech Republic) and the right to establish branches (12 branches of foreign insurance companies were providing insurance services at the end of 2005). These were mostly non-life or universal insurance companies and branches. The presence of these entities increases the competitive pressure on the domestic market. Foreign owned insurance companies control 76% of the assets market. The rest is controlled by domestic insurers. Overall, 11 resident insurance companies have shown interest in providing services in other EU countries.

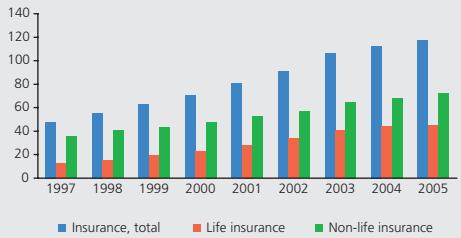
The range of products offered on the insurance market is expanding. Approximately 250 types of insurance are currently offered in 6 categories of life insurance and 18 categories of non-life insurance. Traditional branches are the most important. These include insurance policies and premiums linked to permanent life insurance and combined term and permanent insurance (60% of life insurance premiums). As regards non-life insurance, the most important categories are vehicle liability insurance (31% of non-life insurance premiums), property insurance for entrepreneurs and citizens (24%), vehicle accident insurance for entrepreneurs and citizens (21%) and business insurance (17%).

Non-life insurance claim costs increased in 2002 and 2003, owing mainly to flood-related occurrences. Higher coverage also significantly contributed to the rise in costs. Life insurance costs grew in 2003 and 2004 due to renewal of policies and claim payments linked to the expiration of original policies. Expiration of medium-term one-off life insurance policies also played a role.

As insurance products develop, insurance companies accumulate larger technical reserves to cover their liabilities. In non-life insurance, claim costs reached 46% of technical reserves. In life insurance, where claims payable occur at a long-term horizon, claim costs were 12% of technical reserves. Formation of reserves has to be approved by the CNB (from 1 April 2006). Insurance companies create reserves as cover against the risks of uncertain amounts and uncertain timing of claims (for example, claim payments increased by more than 50% year on year after the floods in 2002). They also create other types of reserves against business risks undertaken. Claim payments were most often related to life insurance (33% of total claim payments), vehicle liability (19.6%), vehicle accidents (17.7%) and natural disasters (4.3%).

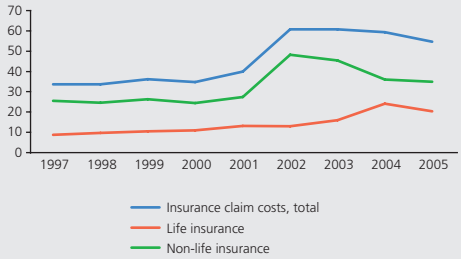
Technical reserves are a source of funds for investment in financial assets. Such investment must meet the criteria of safety, return, liquidity and diversification. In 2005, insurance companies invested 52.5% of their technical reserves in risk-free bonds and 8.5% in bank deposits. Other investments are made in property, mortgage bonds, marketable shares and bonds and only minimally in derivatives. Insurance companies meet the criteria for prudential allocation of investment.

CHART IV. 47
Life and non-life insurance (premiums written)
(CZK billions)



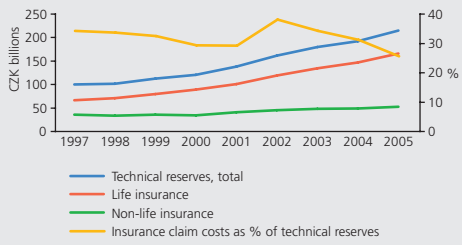
Source: MF CR, CNB

CHART IV. 48
Insurance claim costs
(CZK billions)



Source: MF CR, CNB

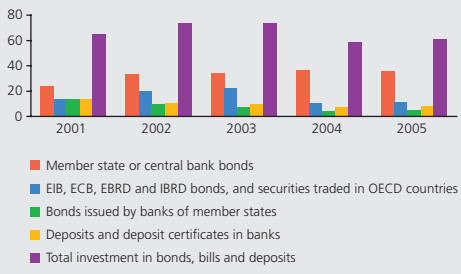
CHART IV. 49
Total technical reserves
(CZK billions; %)



Note: The data relate to net technical reserves, i.e. net of the share of reinsurers in creation of reserves, and exclude the Czech Insurers' Bureau.

Source: MF CR, CNB

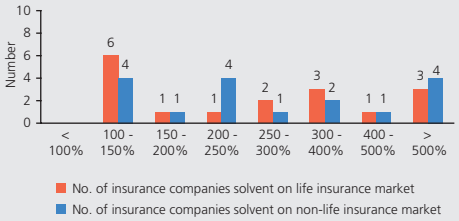
CHART IV. 50
Financial investment in safe assets
(% of financial investments)



Note: Technical reserves are the main source for financial investment.

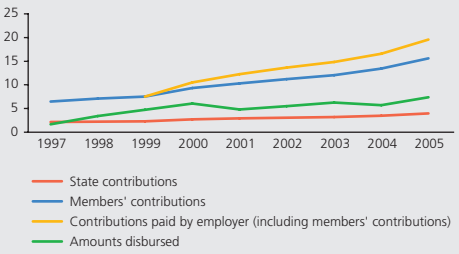
Source: MF CR, CNB

CHART IV. 51
Number of insurance companies satisfying the disposable to required (minimum) solvency ratio (%) in 2004



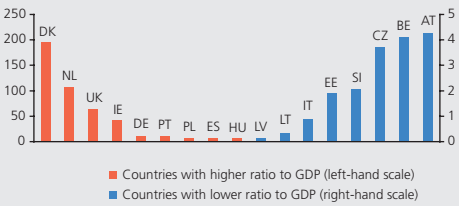
Source: MF CR, CNB

CHART IV. 52
Pension fund sources and amounts disbursed in the given year
(CZK billions)



Source: MF CR, CNB

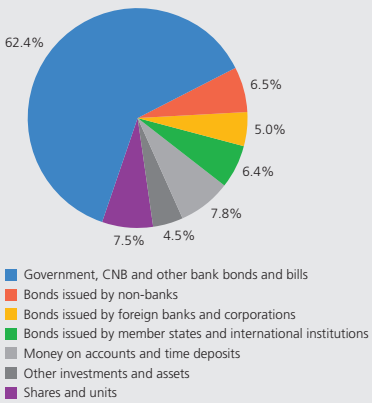
CHART IV. 53
Pension scheme members' funds in 2004
(% of GDP)



Note: Selected countries. Country abbreviations given in list of abbreviations.

Source: CNB, ECB

CHART IV. 54
Structure of pension fund investments in 2005
(%)



Source: CNB, MF CR

According to data for 2004, all insurance companies complied with the solvency criteria, i.e. they had internal funds greater than, or at least equal to, the required (minimum) solvency ratio. Aggregate disposable solvency was 3.4 times higher than the required solvency ratio on the life insurance market and 3.3 times higher on the non-life insurance market (EU countries reported a weighted average solvency of 2.2 times the minimum for life insurance and 3.5 times for non-life insurance in 2004). The stability of insurance companies was also fostered by a high return on equity, which reached 51.5% in 2005.

Insurance companies on the domestic and European markets are governed by the Solvency I framework. The European Commission is currently preparing a new solvency regulation model called Solvency II. A draft Directive on Solvency II is expected to be issued in July 2007 and the system will probably have to be implemented by 2009. Legal rules governing the new risk management framework in the insurance industry should take effect in 2010 at the latest.[101]

4.6 PENSION FUNDS

Since private pension schemes came into being, a total of CZK 120.4 billion in contributions has been invested in the system (as at the end of 2005). Of this amount, the state contribution has amounted to CZK 25.6 billion. The stock of liabilities of the eleven active pension funds after collections and payments vis-à-vis members amounts to CZK 113.2 billion. An analysis of the contributions made by the state and members reveals that state contributions are increasing in absolute terms in line with the number of members, but their relative weight in total funds is falling. The growth in funds is being motivated by the state contribution and by tax deductibility. Funds from employers totalling CZK 11.3 billion, to which the state contribution does not apply, receive preferential treatment in terms of taxation and the social insurance assessment base. Overall, around CZK 43 billion has been paid in benefits since 1996, of which CZK 36.4 billion was paid for lump-sum settlement, CZK 5.6 billion as termination settlement and CZK 0.3 billion as retirement pensions.

The growth potential of pension schemes is considerable, as is apparent from a comparison with the available data for eight euro area countries (around 17% of GDP). The share of pension scheme assets to GDP in the Czech Republic was still relatively low in 2005, at 4.2% of GDP. Due to demographic trends, further growth in private pensions is expected, as a supplementary pillar to the pay-as-you-go state pension system. Occupational pension funds are another alternative. Permitting occupational pension scheme institutions from EU member states to operate by law in the Czech Republic is currently being discussed.

Under the limits set by law, pension funds prudentially invest the funds collected from members in safe assets. As at the end of 2005, 62.4% of assets were invested in bonds and bills issued by the state, the CNB and credit institutions. 11.4% were invested in bonds issued by OECD countries, foreign banks and international institutions, which are traded in regulated markets in other OECD countries. Deposits with domestic banks accounted for 7.8%, while 18.4% were located in other investments in 2005.

101 Solvency II represents a major change in the regulatory framework in the insurance industry. It requires a systematic and comprehensive approach to risk management. Like the Basel II framework for banks, Solvency II is based on three pillars. Under Pillar I, capital requirements will be defined with regard to the risk underwriting system and the nature of the assets and liabilities of the insurance company. Pillar II will require insurers to have in place adequate control mechanisms and risk management systems. Pillar III should reinforce the previous two pillars by setting requirements for information disclosure and transparency. In line with the procedure organised by the CEIOPS (Committee of European Insurance and Occupational Pensions Supervisors) and the recommendations of CEA (Comité Européan des Assurances), insurance companies were meant to submit information on their level of prudence and formation of current technical reserves as part of the QIS1 quantitative impact study by the end of 2005 and submit solvency requirements under the QIS2 quantitative impact study by May 2006.

Pension funds have achieved a sustained high return on assets from net profits, which in 2005 stood at 3.7% and was higher than that of banks and insurance companies. The profits have helped to increase the value of investors' contributions.

The possibility of investment schemes with a risk profile excluding any guarantee to provide a return on investors' contributions has been discussed in recent years as an alternative to the current pension scheme with guaranteed positive annual yield. Under this type of pension insurance, riskier but probably more profitable allocation of investment would be possible.[102]

4.7 OTHER CAPITAL MARKET PARTICIPANTS

Besides banks, insurance companies and pension funds, collective investment undertakings (domestic open-ended mutual funds and foreign mutual funds) engage in capital market transactions. Other organised market participants include investment companies, investment firms, brokers and investment intermediaries. These institutions and persons active on the market meet the licensing requirements and prudential rules in accordance with European law and are subject to state supervision.

4.7.1 Investment Companies

In 2005, nine investment companies were operating on the capital market, four of which were foreign owned and two were controlled by resident banks. The companies maintained a high RoE of 14.6% and an RoA of 12.8%. Investment companies administer domestic open-ended mutual funds. The accounts and transactions of these funds are separate from transactions for the company's own account. One investment fund formed during the privatisation period is still in administration, but it should be transformed into an open-ended mutual fund.

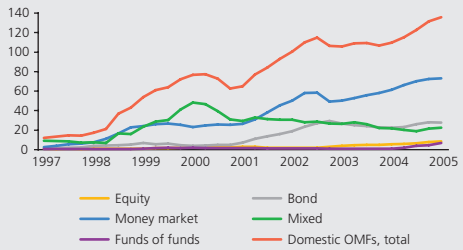
4.7.2 Open-Ended Mutual Funds (Domestic and Foreign)

Domestic open-ended mutual funds are a developed form of collective investment in the Czech Republic. As of the end of 2005, 60 funds were active, holding total assets of CZK 135 billion. Of this number, 36 funds, with assets of CZK 120 billion, were administered through domestic subsidiary banks. Open-ended mutual funds invested mainly in bonds: 36% in government bonds and 47% in other bonds. The funds channelled less investment into domestic securities (9%) and invested their remaining funds in foreign securities. In doing so, they may have been motivated by prospects of higher returns, risk diversification and the limited investment opportunities in the Czech Republic.

Foreign mutual funds offer products on the domestic market through registered investment intermediaries and investment firms. Investment as such is carried out by an investment company (fund) with a registered office abroad. The total amount invested in foreign funds in the Czech Republic was CZK 90 billion in 2005, 90% of which was intermediated by banks.

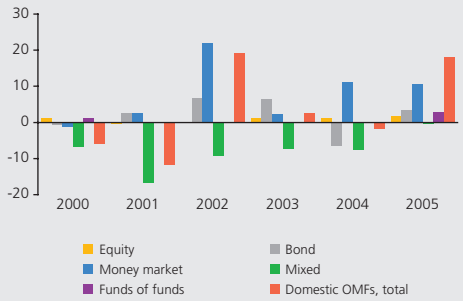
Net sales of CZK 18.2 billion in domestic funds' units in 2005 proved that households were interested in investing. Money market funds prevail over bond and mixed funds in Czech households' financial investment structure. There is growing interest in guaranteed funds offered from abroad, which offer a contractual guarantee of return of principal and a minimum yield. Real estate

CHART IV. 55
Assets of domestic open-ended mutual funds
(CZK billions)



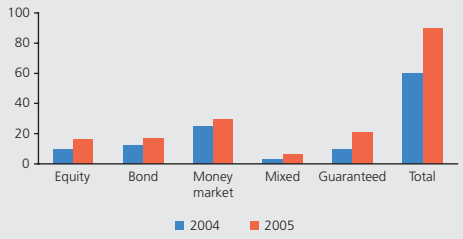
Source: AFAM ČR

CHART IV. 56
Net sales of domestic open-ended mutual fund units
(CZK billions)



Source: AFAM ČR

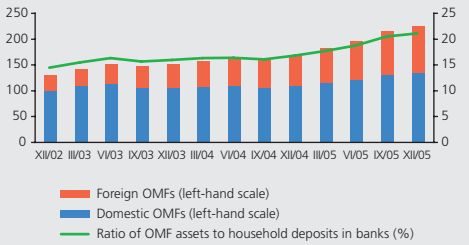
CHART IV. 57
Assets of foreign open-ended mutual funds
(CZK billions)



Source: AKAT

102 Owing to the integration of financial market supervision into the central bank as from 1 April 2006, funds' pension schemes and changes thereto are subject to the approval of the Czech National Bank instead of the Ministry of Finance.

CHART IV. 58
Assets of open-ended mutual funds
(CZK billions; %)



Source: CNB, AFAM ČR, AKAT

CHART IV. 59
Returns of investment firms in 2005
(%)

Source: CNB

funds are common abroad. The legislation needed for the establishment of this type of mutual fund has already been prepared in the Czech Republic. The law allows the establishment of special funds, which are aimed at institutional investors or wealthy persons. A special fund of qualified investors can thus be established.[103]

Collective investment funds are designed mainly for individual investors, i.e. for households. They are an important alternative to bank deposits, although they are not a full substitute. Funds' assets gradually increased and stood at 21% of households' bank deposits at the end of 2005. The expansion of funds' assets is not connected solely with investments motivated by short-term factors. Medium-term and long-term investments, which are of a saving nature, are also on offer. Banks are heavily involved – either themselves or through their subsidiary investment companies – in the intermediation of transactions. Together with associations of funds, they are fostering greater transparency in this market segment.

4.7.3 Investment Firms

In recent years, a process of re-registration of investment firms (i.e. securities dealers) has been going on in the capital market, with an emphasis on capital adequacy and market discipline. The shallow market of publicly tradable shares and bonds has been another factor resulting in a reduction in the number of investment firms. There were 50 investment firms active in the capital market at the end of 2005, of which 14 were banks. The total assets of non-bank investment firms amounted to CZK 21 billion. Bank and non-bank investment firms carried out large volumes of transactions for their clients – around CZK 635 billion every day on average. Most transactions involved interest rate forwards and futures (85.4%) and transactions in bonds and bills (7.7%).

Non-bank investment firms generally achieved higher profitability than bank investment firms. This was due to their lower capital compared to banks, and also their generally more efficient selection of transactions. The capital ratio of investment firms was high (average 97%, median 72%), but the values were dispersed over a wide range (from 9% to around 628%). This is due mainly to the fact that only some investment firms trade actively on their own account and have positions in their trading portfolios for which capital requirements are calculated. The volatility of the results is due to the nature of their activities, which entails frequent changes in the trading portfolio positions held.

4.8 INTERNATIONAL ASPECTS

The Czech financial sector is majority controlled by foreign owners. At the end of 2005, foreign investors controlled 96.2% of assets in the banking sector. Most of these investors were from EU countries (91.4%). The first important phase of arrival of foreign owners took place during the privatisation of the large banks. Another important phase, associated with a wave of mergers and acquisitions, is still going on. The situation is similar in the second largest Czech financial sector, i.e. insurance, where foreign owners held 76.8% of assets and owners from EU countries 72.4% at the end of 2005. The position of foreign investors in the pension fund sector is slightly less significant, but not negligible. They controlled 36% of total assets at the end of 2005, with owners from EU countries holding 13%.

103 To publicly offer foreign special funds in the Czech Republic, a permit is needed from the Czech Securities Commission. To publicly offer foreign standard funds (UCITS) in the Czech Republic, the single licence principle applies, i.e. there is a duty to notify the supervisor (the CNB). The single European licence can be applied in the Czech Republic also by foreign investment companies with variable capital (SICAV) and their funds. A total of 1,104 registered foreign funds (of which 1,037 are from EU countries), including hedge funds, venture capital funds and private equity funds, operate on the domestic market. These funds are not a traditional form of collective investment and are aimed primarily at institutional investors.

The reasons affecting a parent company's decision whether to operate in other countries through a subsidiary or a branch are diverse. They often depend on the financial group's strategy, the host country's legislation[104] and the historical conditions under which the foreign institution entered another foreign market. Some large European institutions have a strong preference for one form; others make use of both forms of foreign presence. If one form has already been established and is successful, companies carefully consider whether it is advantageous for them to change, i.e. whether the expected future benefits will outweigh the costs incurred as a result of conversion from the existing legal form.

As from 1 May 2004, parent banks, insurance companies, investment firms, investment companies and their funds resident in the EU may more easily convert their subsidiaries into branches, which continue to be governed by the single European licence. Owners of those insitutions outside the EU can also do this if they operate a subsidiary active on the relevant market in a member state. One bank made use of this possibility in 2005; no change of this type occurred in the insurance industry.

Box 4: Reasons Affecting the Decision on the Legal Form of the Activities of Foreign Financial Institutions in the Czech Republic

Opportunities for tax, legal and regulatory arbitrage are the most important factors evaluated by financial institutions when selecting the legal form of their activities in another country. There are also other factors that may have been (or still may be) decisive in specific cases. In the past, the possibility of separating any loss from the parent company's result (i.e. a loss not becoming automatically part of its own profit/loss) may have motivated financial institutions to prefer subsidiaries to branches.[105] Separate parent and subsidiary companies can also be more attractive from the viewpoint of any risk spill-over and the ensuing capital requirements and the resulting level of capital adequacy. By contrast, a branch makes central risk management easier, which usually leads to a reduction in personnel costs. The client's perception of a foreign owned financial institution can be a sensitive issue. Some owners have decided to keep their subsidiary's original name as a symbol of long-running tradition and security for clients. This would have been hard to achieve in the case of a "mere" branch.

In selecting the legal form of their activities in the Czech Republic, foreign bank owners can also decide whether to contribute a fixed, predefined percentage of their deposits to the deposit insurance scheme in the Czech Republic or whether to join their home country's scheme. Participation of subsidiary banks in the Czech deposit insurance system is compulsory. Participation of branches is compulsory only if the home country's system does not meet the requirements of European Community law. In some cases, participation in the home system can allow the bank to pay lower sums at later dates, as some foreign systems use ex post or mixed payments. Under the Act on Banks foreign bank branches can take out top-up deposit insurance under a contract with the Deposit Insurance Fund if the home insurance scheme is less favourable for the branch's depositors than the deposit insurance provided for under Czech law. Two foreign bank branches operating in the Czech Republic currently make use of this option.

Tab. IV. 1

Presence of banks from the European Economic Area in the Czech Republic
(number; December 2005)

Country of origin	Subsidiaries	Branches	Notifications	Representations
Belgium	3	1	1	
Denmark			1	
France	2	1	10	2
Ireland			5	
Italy	1		3	2
Cyprus			2	
Latvia				2
Luxembourg			5	
Hungary			3	
Germany	4	3	17	4
Netherlands		2	3	1
Poland			1	
Austria	6	3	29	4
Slovakia	1	1	1	1
Slovenia				1
Spain			1	
United Kingdom		1	24	
EU	17	12	106	17
Iceland			1	
Norway			1	
EEA	17	12	108	17

Note: Subsidiaries, including indirect ownership

Source: **CNB**

Tab. IV. 2

Presence of insurance companies from the European Economic Area in the Czech Republic
(number, December 2005)

Country of origin	Subsidiaries[1)]	Branches [2)]	Notifications [3)]
Belgium	1		9
Denmark	1		7
Estonia			2
Finland			6
France	2		24
Ireland			56
Italy			17
Lithuania			2
Latvia			1
Luxembourg			13
Hungary			5
Malta			2
Germany	5	4	22
Netherlands	3	2	23
Poland			4
Austria	3	2	20
Slovakia		3	5
Slovenia	1		3
Spain			1
Sweden			13
United Kingdom	1	1	87
EU	17	12	322
Liechtenstein			2
Gibraltar			4
EEA	17	12	328

Notes:
1) Domestic insurance companies with predominantly foreign capital
2) Branches of insurance companies from the EU in the Czech Republic
3) Insurance companies and branches from the EU which have expressed an interest in carrying on insurance business in the Czech Republic under the freedom to provide services temporarily.

Source: **CNB**

104 For example, branches were not allowed in Poland until the single European licence was applied.

105 At present, this possibility is considerably limited by the obligation to consolidate.

Tab. IV. 3

Presence of investment firms from the European Economic Area in the Czech Republic
(number; December 2005)

Country of origin	Subsidiaries[1)]	Branches [2)]	Notifications
Belgium	4	1	
Denmark			1
Finland			1
France			4
Ireland			4
Cyprus			9
Luxembourg			3
Malta			1
Germany		2	4
Netherlands	1	4	9
Austria	1	2	15
Greece			1
Slovakia		1	4
Slovenia			1
United Kingdom		1	152
EU	6	11	209
EEA	6	11	209

Notes:
1) Subsidiaries, including indirect ownership.
2) Usually branches of bank investment firms.

Source: **CNB**

In the Czech Republic, the scope and structure of operations also seem to be relevant to the selection of legal form. Major subsidiary banks have large assets and their operations are diversified to a great extent in terms of both structure and regional distribution of services. Larger branches generally focus on transactions in the interbank market and major corporate and private clients. Smaller branches also serve smaller clients and usually find their client segment in a more narrowly defined region. A very limited number of outlets are needed in both cases, and often the registered office of the foreign bank branch is also the only outlet for the public. In the Czech Republic, the coexistence of subsidiaries and branches and their relative number is closely related to the entry of some large foreign banks to the Czech market through purchases of state interests in existing banks. Other foreign entities have obtained new licences. In such cases, they have often opted for a branch.

Large foreign financial institutions that operate in the Czech Republic through their subsidiaries and branches have also often entered the markets in the other new EU member states in Central Europe. Businesses controlled by other major European groups also operate in CEC5 countries. So far, they have not actively entered the Czech market, although some have already laid the groundwork by giving notification of cross-border provision of financial services under the freedom to provide services. The Czech regulator had received 108 notifications from foreign banks as of the end of 2005. These banks may carry on their activities under the free movement of services, unless the services offered have the character of permanent economic activity. Seventeen representations of foreign banks were also active in the Czech Republic. The situation is similar in insurance, with twelve active branches/organisational units of foreign insurance companies. A total of 328 notifications from foreign insurance companies had been filed with the supervisor by the end of 2005. As of 31 December 2005, owners from the EU accounted for 71% of foreign-controlled bank subsidiaries, 100% of branches and 98% of notifications.

The legal form of the activities of foreign banks, insurance companies and other supervised entities in the Czech Republic has consequences for regulation and supervision. Given the current ownership structure, the responsibilities of the Czech authorities in maintaining financial stability appear bigger than their powers and tools for preventing imbalances. In this context, the need for ever increasing co-operation with foreign central banks, ministries, and especially regulators and supervisors, even on an inter-industry basis, has become the priority.[106]

The effects of foreign ownership, which is still also characterised by the dominant position of foreign top managers, are currently positive. Thanks to foreign management know-how, new technology, a wider range of products and services, modern distribution channels, improved risk management and strengthened internal control systems, financial institutions are recording profits, sufficient capital adequacy and better loan quality. The initial "clashes" with foreign management styles have now been overcome.

106 The publication *Banking Supervision 2005* deals with the issue of international co-operation between supervisors in more detail.

However, foreign ownership can also bring new risks. It creates new channels of transmission of foreign shocks to the domestic financial sector (this issue is discussed in the box *Consequences of Capital Inflow and the Risk of Cross-Border Contagion* in section 2.3 *Developments on the Financial Markets*). It accelerates the introduction of new banking products and technologies in the Czech Republic, which means that Czech clients almost immediately face all the potential risks generated by some innovations. Inadequate risk assessment may be another potential risk if the parent company implements its risk models based on home country data without adjusting them to the financial indicators of the host country.

The subsidiaries and branches of foreign financial institutions in the Czech Republic are often not very important to their groups in terms of share in assets. However, they have repeatedly become a significant source of profit for their owners. Repatriation of earnings is discussed in section 4.4.1 *Creation and Allocation of Profits*. From the point of view of the Czech economy, these entities are often of systemic importance. The three largest banks (all of them subsidiaries of EU banks) persistently represent more than one-half of the Czech banking sector's assets.

As regards financial stability, the potential for transmission of contagion between foreign owners and the Czech banking sector can be assessed using the performance of these entities. If foreign owners perform better, this indicates transfer of their reputation, know-how and other positive factors, including the possibility of providing financial assistance if the banks they own run into difficulties. If the performance of foreign owners deteriorates, the businesses they own in the Czech Republic might be put at a disadvantage, including through excess repatriation of earnings.

The current relations between major Czech banks and their owners are illustrated by a comparison of profitability ratios, namely return on Tier 1 and return on assets. Significant factors underlying profitability (efficiency, net interest margin and quality of assets) or implicitly resulting from it are also discussed. Overall capital adequacy and Tier 1 capital adequacy are examples of the latter. They are conditional on sufficient profit generation and the owner's strategic decision on profit distribution.

The five largest subsidiary banking institutions controlled by EU owners have high rates of return on assets and capital, which in recent years have exceeded the returns of their parent banks and affiliated companies from the CEC5 region. Profit generation also affects the level of overall capital adequacy and Tier 1 capital adequacy. In the period under review, the level of capital in Czech banks and the banks under comparison was more than sufficient. However, massive payments of dividends in the Czech Republic affected its resulting level. The differences between overall and Tier 1 capital adequacy are a result of the different structure of capital in Czech and foreign banks.

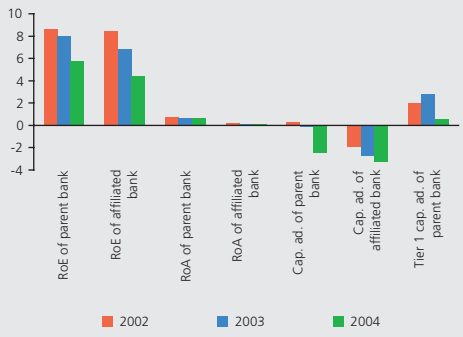
Important factors affecting the profitability of a bank include the quality of its loan portfolio, the efficiency of its internal operations and its ability to generate interest profit. Czech banks have recently significantly enhanced the quality of their loans to a level comparable with their parent companies. Thanks to high profit generation, the five Czech subsidiary banks under review record lower cost-income ratios (operating expenses/profit from financial activities) than their owners. Net interest margin is higher than in parent banks, but is below the average for affiliated banks.

The differences in the monitored indicators in the five largest foreign bank branches in the Czech Republic and the foreign banks themselves are negligible. The exception is efficiency as measured by the cost-income ratio. This ratio is much lower for the Czech entities. Foreign bank branches also record high values of other efficiency indicators such as total assets per employee or profit from financial activities per employee.

CHART IV. 60

Comparison of profitability and capital adequacy ratios of the five largest Czech banks and their foreign parent and affiliated banks

(p.p. differences in average ratios of Czech and foreign banks)

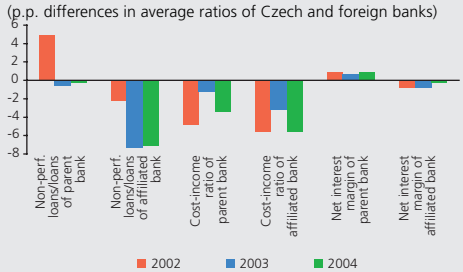


Source: **CNB, BankScope**

CHART IV. 61

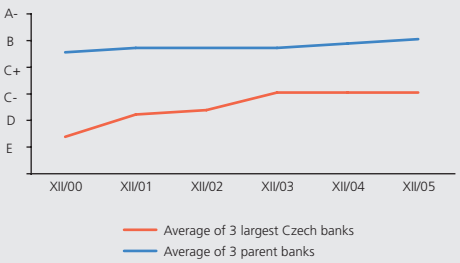
Comparison of factors determining the profitability of the five largest Czech banks and their foreign parent and affiliated banks

(p.p. differences in average ratios of Czech and foreign banks)



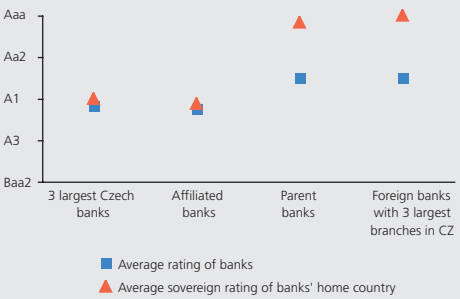
Source: **CNB, BankScope**

CHART IV. 62
Ratings of Czech banks and their foreign owners
(financial strength ratings; Moody's)



Source: CNB

CHART IV. 63
International comparison of bank ratings
(long-term foreign currency rating; Moody's; December 2005)



Source: CNB

The evolution of the external ratings issued by major international rating agencies in 2000–2005 illustrates the positive developments in the major foreign owned Czech banks. The ratings of major Czech banks by Moody's, Standard&Poor's and Fitch have improved. The banks have been regularly upgraded since privatisation, mainly because of higher profitability and efficiency, increased competition and marked improvements in services provided and credit risk management. Over the last three years in particular, banks have been strengthened by the completion of their restructuring. As a result, in November 2005 Moody's launched a reassessment of their financial strength ratings, with potential upgrades for two out of the three largest Czech banks. For the remaining large bank it changed the outlook to positive. In the opinion of Moody's, the large Czech banks would receive financial support from their strategic foreign owners if necessary. Standard&Poor's also upgraded the long-term credit rating of the three largest Czech banks in 2005. In its assessment of systemic risk, Fitch assigned the Czech banking sector a C1 rating. Other countries in the region (except Slovenia) received lower ratings.

An international comparison of financial strength ratings at the end of 2005 revealed that the major Czech banks, along with Hungarian banks, had the best ratings in the CEC5 region. The ratings of the affiliated companies of our largest banks operating in the CEC5 region are identical or one grade lower. The sovereign ratings of the countries[107] where they operate are about half a grade lower on average than the Czech Republic's sovereign rating. The average rating of the foreign owners of the three largest Czech banks is about 1.5 grades higher than the average rating of Czech entities. The sovereign ratings of the owners' countries are considerably higher than that of the Czech Republic. The three largest branches active in the Czech Republic are branches of banks with an average rating of Aa3 from countries with the highest possible rating of Aaa.

The improving ratings of the largest Czech banks and the clear trend of convergence towards those of their parent companies illustrate the stability of the financial system in the Czech Republic. The almost comparable ratings of their affiliated banks do not give rise to any concerns about problems emerging and spreading through the parent banks into our financial system. The financial soundness of foreign bank branches operating on our market is also very good in terms of ratings, hence no potential risk can be identified in this area either.

Czech financial institutions are involved in foreign financial institutions only exceptionally, which reduces the channels of risk transmission. At the end of 2005, two Czech banks controlled two banks abroad, both in Slovakia. The largest Czech bank has an extensive branch network in Slovakia and another Czech bank has launched operations there under the single European licence. Banking activities with Slovakia are therefore among the most important operations with non-residents. This implies that economic developments in Slovakia may in turn affect the positions of the Czech banks operating in Slovakia.

Czech resident insurance companies operate abroad through two branches, namely in Slovakia and Norway. Moreover, eleven resident insurance companies have gained the opportunity to carry on business in other countries under the freedom to provide services without establishing a branch. The notifications concern all European Economic Area countries. At the end of 2005, two Czech banks also showed interest in this form of provision of services abroad. In the overwhelming majority of the cases where a resident entity has ownership interests abroad, the ultimate owner of the whole group is a foreign entity. The single exception is a privately owned Czech financial group carrying on business under the Act on

107 A country's rating is usually called a sovereign rating, as it is the highest possible rating (with some exceptions) that any entity in the country may obtain.

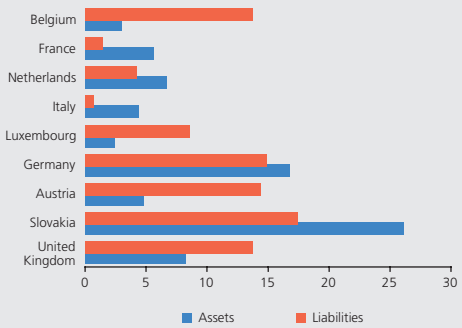
Financial Conglomerates. It holds interests in banks, insurance companies and other regulated and unregulated financial and non-financial entities in several European and Asian countries. These interests are not direct holdings of banks or insurance companies. Nonetheless, these institutions may also be affected by adverse developments in those countries where another member of the group is active.

In 2005, the average overall asset exposure vis-à-vis non-resident entities was 21% of the banks' balance sheet, whereas on the liabilities side the figure was almost one-half. EU accession has not resulted in any major changes in the structure of regions with which Czech banks maintain relationships. Many business contacts had been established before the Czech Republic's accession to the EU on the basis of strategic ownership. In recent years, the share of operations with the old and new member states has been around 90% of all foreign activities. Territorial risk arising from transactions with non-residents is not high thanks to their generally limited volume and diversification in terms of trading partner countries.

The structure of exposures to non-residents differs depending on bank and country. In 2005, the overall position of the banking sector vis-à-vis non-residents relative to its total assets was +7.3% on average and this level is being maintained primarily because of the stabilised situation in the large bank group. Foreign bank branches and small and medium-sized banks have recorded much more volatile developments, ending 2005 with final short positions owing largely to operations on the interbank market. Close relations are maintained with banks in countries where Czech banks have their headquarters or parent companies, banks in major financial centres and, as mentioned above, banks in countries where branches and subsidiaries of Czech banks are active. The average share of interbank transactions with non-residents is relatively high. Throughout 2005 it fluctuated around one-half of the total volume of the interbank market. Such transactions represent the largest proportion of the sources of asset financing for some banks.

CHART IV. 64

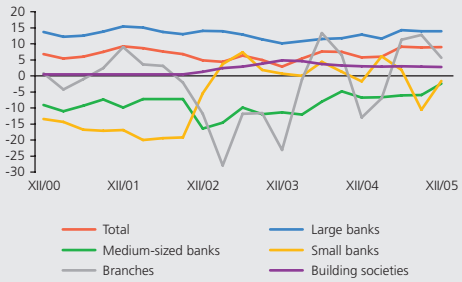
Banking transactions with partners in EU countries
(% of total exposure to non-residents; 2005 average)



Source: CNB

CHART IV. 65

Position of the banking sector vis-à-vis non-residents by group
(% of total assets of given group)



Source: CNB

5 THE FINANCIAL INFRASTRUCTRE

The financial infrastructure, taking the form of payment systems and securities settlement systems, safeguards the transfer of assets between economic agents. Smooth operation of this infrastructure has a significant impact on the efficiency of the financial markets and the real economy. Payment systems and securities clearing and settlement systems are also channels through which the potential problems of one market participant may spread and set off a chain reaction, leading in extreme cases to financial instability. Therefore, it is vital to ensure that the infrastructure is not only efficient, but also safe and secure.

Oversight of payment systems and securities settlement systems consists primarily in setting rules and standards that minimise systemic risk and promote efficiency of the systems, and subsequently in implementing those standards. By law, the CNB performs oversight of the CERTIS and SKD systems.[108] As in previous years, the operation of both systems was smooth and trouble-free in 2005.

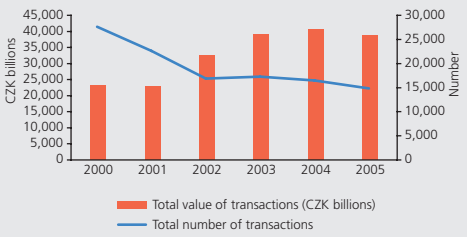
Besides the financial infrastructure as such, some aspects of the regulatory environment are an important factor affecting financial stability. In 2005, these included in particular the compulsory introduction of international accounting standards that can be regarded as part of the financial infrastructure in the broader sense.

5.1 SKD AND CERTIS – TRANSACTION VOLUMES AND RECENT DEVELOPMENTS

The Short-Term Bond System (SKD) is used for issuing and registering all book-entry securities with maturities of up to one year and for settling trades in these securities. In 2005 it processed around 14,500 transactions with a total value of CZK 38,742 billion. An average of CZK 154 billion was processed every day. SKD's turnover in roughly 19 days equalled annual nominal GDP. The total transaction value of around CZK 40 billion has been broadly stable since 2003. The interest-free intraday credit that the CNB provides to SKD clients for smooth settlement of operations in the CERTIS system rose from CZK 3,055 billion in 2004 to CZK 3,557 billion in 2005, i.e. by roughly CZK 500 million. The steady rise in the volume of intraday credit in recent years can be attributed to banks' increasing awareness of the ways it can be used. The higher recourse to intraday credit is having a positive impact on the smoothness of operation of CERTIS and thus on the stability of the payment system.

A fundamentally revised version of the SKD rules was published in 2005. The rules govern the SKD environment and the rights and duties of SKD participants in compliance with legal changes related to the Czech Republic's EU entry (in particular, they reflect legislative changes linked with the amendment of the Capital Market Undertakings Act and the Securities Act). The new version of the Rules takes into account changes in the SKD, which have extended its functionality, made it more user-friendly and enhanced its security.[109]

Chart V. 1
Volume and number of transactions processed in SKD



Source: CNB

Tab. V. 1
CERTIS interbank payment system – statistical information

Period	Turnover (CZK billions)	Average daily turnover (CZK billions)	No. of transactions (millions)	Average daily no. of transactions (millions)	GDP/ Average daily turnover
2002	100,343	431	262	1.12	5.6
2003	96.938	385	317	1.26	6.6
2004	110.127	434	333	1.32	6.4
2005	123.354	488	356	1.40	6.0

Source: CNB

Tab. V. 2
CERTIS interbank payment system – charges
Charges billed to the payer's bank (in EUR)

	Encrypted non-priority items	Non-encrypted non-priority items	Priority items
17:00 – 00:00	0.008	0.013	0.17
00:00 – 08:30	0.022	0.027	0.17
08:30 – 12:30	0.044	0.05	0.17
12:30 – 13:30	0.17	0.17	0.34
13:30 – 14:30	0.67	0.67	0.67
14:30 – 15:30	6.72	6.72	6.72

Source: CNB

108 A more detailed description of the systems was published in the 2004 Financial Stability Report.

109 Electronic communication between the agent's employees and the SKD is protected by encryption and electronic signature. The CNB as the certification authority issues certificates to the agent's employees which entitle them to communicate electronically with the SKD under the principle of distributed responsibility. That means the CNB only guarantees the identity of selected employees of the agent (administrators), who in turn guarantee the identity of other employees of the agent.

The biggest change was the creation of the function of custodian[110] in the SKD. Custodians maintain customer accounts within the legally permitted two-tier registration of securities. A custodian does not own securities; they remain in the ownership of its customers. Custodians thus become SKD participants alongside agents and clients.

In 2005, the CERTIS interbank payment system processed 356.2 million transactions totalling CZK 123,354 billion. The average daily number of transactions processed by CERTIS has grown steadily since 1992, reaching 1.41 million in 2005. The average daily transaction value was CZK 488 billion. This means that it took six business days to reach a turnover equal to annual nominal GDP. 2005 saw a record of 4,456,396 items processed without trouble during a single day. The previous maximum reached in 2004 was exceeded by almost 21%. Even this all-time high was below the capacity of CERTIS, which was designed to process 5 million items. Even if this limit were to be temporarily exceeded, the system has mechanisms to ensure smooth operation. The smoothness of the system's operation is also aided by a fee-charging policy which motivates users to enter most transactions during the first part of the business day so that accumulation of payments towards the end of operating hours is avoided.

In order to test the functionality of the CNB clearing centre's backup facility, CERTIS items were processed in this facility on two days in 2005. Operation was not interrupted and no problems with its smoothness occurred. Regular testing of the backup facility is a part of the contingency plan to ensure operational reliability of the system. Such testing contributes to the fulfilment of Core Principle 7 (see section 5.2 for details on the Core Principles).

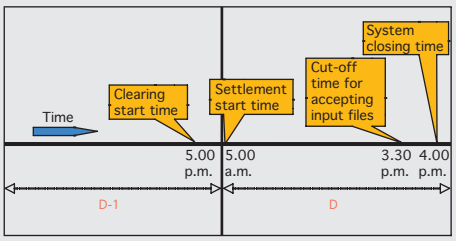
5.2 OVERSIGHT OF THE CERTIS AND SKD SYSTEMS

Ensuring the safe and smooth operation of CERTIS and SKD is one of the key tasks entrusted by law to the CNB, which administers and supervises these systems. The systems are, therefore, subject to regular internal audits, but they are also monitored and assessed in terms of compliance with international standards. The participants in securities clearing and settlement systems face a number of risks that must be identified and analysed so that they can be managed effectively.

Box 5: Risks in Securities Settlement Systems and Payment Systems[111]

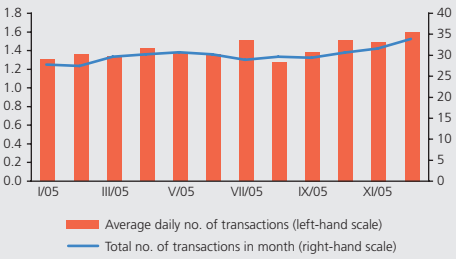
1. Risks in securities settlement systems (SSS)
The main risks facing SSS participants consist in their counterparties either being unable to meet their obligations (*credit risk*) or meeting their obligations with a delay (*liquidity risk*). Other potential risks are connected with the safekeeping and administration of securities (*custody risk*), failure of information systems or the internal control system (*operational risk*) or failure of the legal framework governing the rules and procedures for the SSS (*legal risk*). If a default by one participant results in other participants being unable to meet their obligations, an SSS may become a source of instability of the whole financial system (*systemic risk*).

CHART V. 2
CERTIS interbank payment system – operating cycle



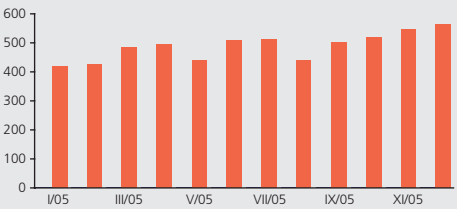
Source: CNB

CHART V. 3
Number of transactions processed by CERTIS in 2005
(millions)



Source: CNB

CHART V. 4
Average daily turnover in CERTIS in 2005
(CZK billions)



Source: CNB

110 Custody is the safekeeping and administration of securities and financial instruments owned by other persons. A custodian is an entity that offers custody services to its customers. In the case of the SKD, a custodian is a legal entity with which the CNB has concluded an SKD customer account contract. Securities owned by persons other than the custodian (the custodian's clients) are registered on this account. A custodian may have one or more customer accounts in the SKD. Each customer account can be accessed by the custodian through an agent specified in the contract. A custodian registers securities on the owner's accounts.

111 The method of risk management in the SKD and CERTIS systems was described in the 2004 Financial Stability Report.

Credit risk is the risk of loss caused by a participant defaulting, usually as a result of his insolvency. There are several types of credit risk. In terms of the effect on the stability of the financial system, *settlement risk* is the gravest one. If a party to a securities transaction goes bankrupt before settlement, the funds are not transferred from the buyer to the seller. If, in the meantime, the settlement system transferred ownership of the security from the seller to the buyer, the seller loses the whole value of the security. If this loss is large, it may in turn cause the seller's bankruptcy and transfer the risk on to his creditors. To eliminate this risk of contagion as far as possible, most SSSs operate on the DVP (delivery versus payment) principle. DVP interconnects the payment transfer system and the securities transfer system so that it is guaranteed that securities are transferred only if payment has been made. An example of three banks shows how the introduction of DVP leads to a reallocation of the demands on the bank going bankrupt. Bank B has obligations to bank C of 25 and assets worth 10. Bank A is not aware of bank B's poor financial condition and sells it securities worth 50. If the SSS does not operate on the DVP principle, it will transfer the securities from A to B on the settlement day. In the meantime, B finds itself in a situation where it cannot pay bank A. B now has assets of 10+50, payables to bank A of 50 and payables to bank C of 25. After B is declared bankrupt, its assets are divided proportionally between A and C. A receives 40 and C receives 20. Bank A thus suffers a loss of 10 and C a loss of 5. Settlement under the DVP system would be different. The transaction between A and B would be cancelled (because B would be unable to pay A). Bank A would therefore record no loss and C would receive B's remaining assets worth 10. The loss incurred by C would be larger (15). This example clearly shows that DVP does reduce the losses of trading partners (bank A) that may be caused by a bank's bankruptcy (B), but also increases the potential losses of other creditors of the bank (C). Therefore, the question arises whether DVP necessarily eliminates the risk of contagion (systemic risk). In this context, we should mention that banks' creditors, who often provide long-term loans to banks and are exposed to such risk for a longer period, usually have sophisticated risk management methods in place and are better able to reduce their risk exposures.

DVP does not address all components of systemic risk. For example, if the seller of a security is unable to deliver the security on the agreed date to the buyer's account, DVP settlement is deferred and then cancelled after an agreed period of time. In the meantime, however, the seller may have sold the security to another party, causing it to be unable to meet its obligations by failing to deliver the security. In order to avoid this type of contagion, the Central Securities Depositories (CSD)[112] organise a securities lending programme. A participant in the programme who has uncovered obligations to deliver securities will automatically receive a collateralised loan from another participant.

Another component of systemic risk relates to the financial soundness of the system. Most CSDs are not allowed to provide credit. Some of them, however, provide collateralised or non-collateralised credit to system participants. For example, the international central depositories Euroclear and Clearstream Banking Luxembourg do so to ensure smooth operation of the system and prevent contagion. Failure to repay such credit may cause problems for the SSS itself. Regulators thus try to make sure that non-collateralised credit is granted to the smallest extent possible and that adequate risk management measures are in place.

112 Entities acting as primary depositories for nearly all securities issued may also perform clearing and settlement. In the Czech Republic, the establishment of a central depository is under preparation.

Settlement risk includes *liquidity risk*. Liquidity risk is the risk that the seller of a security will not receive payment in time and will have to borrow funds or liquidate his assets in order to complete other payments. The buyer of a security faces the risk that he will not receive the security on the agreed date and will have to borrow a security from a third party to meet his obligations. The costs related to liquidity risk depend on the market's liquidity: the more liquid the market, the lower the costs. Liquidity shortages may cause systemic problems, especially in an environment of rapidly changing security prices. Concerns over a loss of the full value of the principal may induce some participants to refuse securities delivery and payment.

SSS participants also face settlement bank *failure risk*. The failure of a bank that keeps money accounts for the settlement of the payment obligations of CSD members may disrupt settlement and result in serious losses and liquidity pressures on these participants. The effect can be particularly grave if all the participants use the same bank. Therefore, in those SSSs where the use of a single bank is required this is usually the central bank or a special-purpose bank with strong risk management and access to considerable funds. A choice of several settlement banks is an alternative.

Custody risk is the risk of loss of securities entrusted to a custodian due to his insolvency, neglect or fraudulent behaviour. Custody risk is particularly important for indirect SSS participants, whose securities are in the custody of direct participants. In this context, we should mention the special features of securities accounts, which differ from money accounts as follows: securities kept on securities accounts with a bank or another entity are not a liability of the bank. The owner of the securities does not lose the securities if the bank goes bankrupt. However, his ability to perform transactions in the securities can be temporarily endangered.

Considerable attention is paid to *operational* reliability, especially in relation to SSSs of systemic importance. The probability of technical problems in the system has to be minimised. For example, the capacity of the system must enable trouble-free operation even with extraordinary volumes of instructions processed. The system should regularly create backup data and a backup facility should exist in a physically separate location, enabling the system to operate smoothly even in emergencies.

The human factor in an SSS may cause incorrect transfers or loss of securities. If an SSS transfers securities to an incorrect party due to an erroneously inputted instruction, the system can be disrupted. The matching of instructions from both parties minimises this risk.

Last but not least, a sound legal framework is necessary for an SSS to operate safely. The risk that unexpected application of a different law will make existing contracts unlawful or unenforceable increases in the cross-border context. *Legal risk* thus amplifies other risks such as market risk, credit risk or liquidity risk.

2. Risks in payment systems

Payment and clearing systems are, as a rule, heavily dependent on SSSs, as they use securities as collateral in their own risk management procedures. As in SSSs, risks in payment systems can be classified as *financial* (credit, liquidity, systemic) and *operational* (human error, abuse, technical failure, legal risk). Operational risks in payment systems are similar to those in SSSs.

It was the financial risks in the original payment systems that resulted in their transformation from netting systems[113] to RTGS (real-time gross settlement) systems. Real-time gross settlement systems are relatively safe, because they completely eliminate credit risk. Central banks have a number of instruments to eliminate liquidity risk, e.g. the provision of intraday credit against collateral. Other measures have also been implemented, such as settlement finality.

The efforts of regulators and other institutions have resulted in the creation of various international standards. Compliance with these standards should minimise the above-mentioned risks as far as possible.

A joint working group of the European System of Central Banks (ESCB) and the Committee of European Securities Regulators (CESR) issued in 2001 and published in 2003 a document called "Standards for Securities Clearing and Settlement in the European Union". The standards were subsequently adapted to the European context and it was specified to which institutions they should apply. To this end, the concept of "systemically important system operator" was introduced, designating an institution whose collapse would have a significant effect on the market as a whole due to the scope of its activities. In 2005, an ESCB-CESR Working Group prepared a revision of the standards, which concerned securities settlement systems as well as central counterparties. The CNB continuously monitors the evolution of the ESCB-CESR standards and is actively involved in the discussions so that SKD is prepared for evaluation against these standards after they are completed.

In September 2002, the ECB Governing Council decided that the ECB would assist the acceding countries in assessing themselves against the "Standards for the Use of EU Securities Settlement Systems in ESCB Credit Operations". The assessment of the SKD system against these standards, which took place in 2003, aimed to make sure that the existing infrastructure was adequate for settlement of securities transactions in Eurosystem credit operations. The results for most of the nine standards were satisfactory and SKD was considered eligible for use in Eurosystem credit operations.

In January 2001, the ECB Governing Council adopted the "Core Principles for Systemically Important Payment Systems"[114] as the minimum requirements of common Eurosystem supervisory policy for systemically important payment systems. The Core Principles apply to all systemically important payment systems in all countries of the world. The CERTIS system is a systemically important system whose operation, in line with the Core Principles, is of key importance to the stability of the financial system in the Czech Republic. Under a Governing Council decision, all ESCB central banks assessed their local systems as of mid-2003. In the case of CERTIS all the relevant criteria were assessed as either "fully observed" or "largely observed".

5.3 REGULATORY DEVELOPMENTS IN THE FINANCIAL INFRASTRUCTURE

The legislative process for the amendment of Act No. 124/2002 Coll., on Transfers of Funds, Electronic Payment Instruments and Payment Systems (the Payment System Act) continued in 2005. In line with European law, the amendment should above all introduce electronic money institutions into Czech law. The conditions under which the CNB grants prior consent to issue electronic money instruments to

113 Payment instructions from payers' banks are collected for a certain period of time and the net mutual positions of banks are calculated and settled as of the end of that period. Netting systems thus do not guarantee settlement finality. Payments become irrevocable only after the transfer of funds from the net debtor's account to the net creditor's account.

114 Issued by the BIS Committee on Payment and Settlement Systems.

entities other than banks have also been simplified and clarified. In 2005, the CNB again conducted a number of administrative proceedings on the issuing of electronic money instruments, within which 19 prior consents were granted, particularly in the bus transport area.

Under an amendment to Act No. 6/1993 Coll., on the Czech National Bank, credit unions may now participate in the CERTIS system. The scope of a CNB decree issued to provide for a single payment and settlement system in the Czech Republic (currently Decree No. 62/2004 Coll.) was also extended to credit unions.

In collaboration with the Financial Arbiter, the CNB was involved in the second amendment to the Act on the Financial Arbiter in 2005. The amendment reacts to the adoption of new administrative procedure rules and eliminates their negative effects on the principles of informality, speed and flexibility of proceedings brought before the Arbiter. It also incorporates into the Act the experience gained from the Arbiter's work.

5.4 THE IMPACT OF THE INTRODUCTION OF INTERNATIONAL FINANCIAL REPORTING STANDARDS ON CZECH BANKS

The introduction of single accounting standards and information disclosure rules undoubtedly contributes to the transparency and comparability of financial statements and thereby to financial stability. The application of these standards, however, may have a significant effect on accounting statements and consequently on the various indicators used to assess the financial soundness of individual institutions and the sector as a whole.

In order to harmonise the European financial markets, the International Accounting Standards Board issues the international accounting standards IAS/IFRS.[115] According to Regulation (EC) No. 1606/2002 of the European Parliament and of the Council of 19 July 2002, these standards are binding for the consolidated balance sheets of companies, including banks, which issue securities listed on European markets, from 1 January 2005. National legislation can extend the application of IAS to individual financial statements of such companies and to all other entities.

Standards requiring fair value measurement of assets are the most important for the calculation of regulatory capital. These include the IAS 39, which is very important for the banking sector because it defines the rules of recognition and measurement of financial instruments. According to this standard, financial assets held for trading, derivatives and instruments available for sale must be measured at fair value, and unrealized profit or loss due to revaluation must be recorded as a direct change in equity (e.g. in revaluation reserves). Loans and receivables, as well as assets held to maturity, must be valued and recorded at their amortised cost. At the same time, however, IAS 39 introduces the fair value option (FVO), which enables the users of the standard to present any financial instrument at fair value. FVO can be applied to all financial assets and financial liabilities without any restrictions at the decision of the company's management.

From the very beginning, the discussions of the FVO concept conducted by experts and the institutions concerned were accompanied by concerns over the effect on financial stability. In the case of assets and liabilities held to maturity, fair value accounting can be misleading and artificial. It can reduce the capacity of banks to respond to adverse developments, increase the volatility of profit and equity, and thereby reinforce the pro-cyclical nature of banking operations. In the event of shocks including a price component (e.g. a radical change in interest rates,

115 IFRS (International Financial Reporting Standards) were originally called IAS (International Accounting Standards).

a property market crisis or a stock market slump), premature recognition of unrealised value changes can further aggravate the impact of the shock. Banks could respond with panicky sales, fostering a deepening of the crisis.

The IASB reacted to this criticism in 2004 by issuing specific rules limiting the use of fair value. In line with this, the EU adopted IAS 39 only in part, in a "carved-out" version without the fair value option. The EU version of IAS 39 prohibits the use of fair value for liabilities (excluding liabilities held for trading and derivatives).

The long-running discussion between auditors and supervisors eventually resulted in a compromise. In June 2005, the IASB adopted basic principles restricting the use of the fair value option from 1 January 2006 to the following: (i) reduction or elimination of accounting inconsistencies in matching instruments; (ii) assets and liabilities managed or internally reported by the management on the fair value principle; (iii) instruments containing embedded derivatives which are not closely linked to the host contract. This modification has the support of EU regulators and the adoption of a full standard for EU member states took effect as of 1 January 2006.

The compulsory application of IFRS in the EU also generated a discussion on the possible impact on capital requirements under the prudential rules. This discussion, conducted at the level of the Basel Committee on Banking Supervision and the Committee of European Banking Supervisors (CEBS) resulted in a proposal for "prudential filters". i.e. changes to accounting capital for the calculation of capital requirements. One of these filters is linked with the application of fair value: profit/loss from the change in the fair value of financial liabilities due to internal credit risk is not to be reflected in Tier 1 and Tier 2.[116]

The assessment of the impact of the introduction of IFRS on financial stability depends largely on the specific conditions in individual countries. The Czech Republic succeeded in harmonising its accounting rules with the IFRS requirements in gradual steps. Among other things, the amendment to the Act on Accounting (effective from 1 January 2002) enabled fair value measurement of assets and liabilities. A related CNB Provision implemented IFRS as far as possible. The introduction of accounting values comparable with IFRS (above all the recognition of securities including short sales at fair value) in Czech financial institutions as from 1 January 2002 did not affect the volatility of financial performance. The charts of accounts, accounting procedures and essential elements of the solo and consolidated financial statements of banks, credit unions, investment firms, investment companies and pension, investment and mutual funds were unified. Under the Act on Accounting, consolidating accounting units that issue securities listed on a regulated market in EU member states must use the international accounting standards governed by Community law when compiling their consolidated financial statements and annual reports. Other accounting units can choose between IFRS and Czech accounting standards when compiling their consolidated financial statements. They have to compile and report their solo financial statements according to Czech accounting standards and regulations. This means that the IFRS are compulsory for almost 70% of the Czech banking sector as measured by total assets. In the Czech Republic, seven banks and one insurance company keep their accounts according to the IFRS. Czech accounting standards,

116 Tier 1 capital is the highest-quality part of regulatory capital. In Czech banks it is also the largest part. Equity capital, retained earnings and statutory reserve funds are the dominant components of Tier 1 capital. Tier 2 capital is currently used less. The most important part of this component of regulatory capital is subordinated liabilities.

used by the remaining banks, are very similar to the IFRS. They are based on the same principles of accounting, clearing and valuation of financial instruments, including derivatives. The compulsory introduction of the IFRS in the Czech Republic therefore did not generate any new risks to financial stability.

The comparability of statements was, however, affected by a change in the international accounting standards themselves, specifically to IAS 39, effective also from 1 January 2005. The revised IAS 39 newly defined the categories, content and manner of reporting of financial instruments. The most important effects of this change on the performance of banks can be observed in the volume and structure of client loans and securities. This is due to a new definition of loans and receivables, which no longer include bonds acquired in the primary market and quoted in an active market.[117] The breakdown of profit from financial activities was affected by a change in the reporting of securities measured at fair value against expenses or income accounts, where accrued interest no longer needs to be presented separately. Thus, interest income from such securities does not have to be included in interest profit but can be part of profit from securities held for trading (in the area of profit from financial operations).[118] These changes should be appropriately reflected in the interpretation of the results of the indicators used to assess financial stability.

117 For example, claims on banking sector clients rose in 2005 H1 by CZK 19.9 billion, or 1.9%, in net terms. Securities acquired in initial public offerings which were not held for trading were reported together with claims (on clients as well as banks) until the end of 2004. Under the amendment, a security is classified in the loans and receivables category depending on whether the financial instrument is tradable on a public market. Thus, loans and receivables now only include securities that are not publicly tradable. The growth claims on clients of the banking sector would have been higher without this change in methodology. It is difficult to determine an exact figure; 8.1% is the estimate.

118 In connection with this change in methodology, 2005 H1 saw a significant increase of CZK 2.5 billion in profit from securities held for trading, which affected the rise in profit from other financial operations of 31.5% year on year.

PART II – THEMATIC ARTICLES

SUMMARY OF THE RESULTS OF STRESS TESTS IN BANKS[119]

The subject of this article is stress tests, which constitute one of the key quantitative tools for the assessment of financial stability. Under one of the approaches, financial stability may be viewed as a situation where the financial system, *inter alia*, shows a high degree of resilience to external shocks. Under this definition, so-called aggregate stress tests are prepared in order to capture the impact of various significant shocks and business risks. In model simulations, the domestic financial system is subject to hypothetical, unlikely, but plausible shocks. The article contains the results of updated basic tests according to the methodology presented in the 2004 Financial Stability Report.[120] In addition, the article newly presents the results of interbank risk testing and results of stress testing for scenarios based on a macroeconomic model.

As part of the quantitative assessment of financial stability, a series of stress tests were performed to examine the resilience of the banking sector to the impact of selected macroeconomic shocks. These tests focus on detecting risks in the credit, exchange rate and interest rate structure of portfolios and capturing the potential impacts of interbank contagion. The tests include scenarios of the impact of macroeconomic variables derived from the CNB macroeconomic forecasting model and the credit risk model as the basis for estimating future portfolio quality.[121] These tests serve as one of the inputs for considerations on increasing the capital and maintaining the solvency of banks. The stress tests were performed at the end of 2005 and concerned 24 banks that held the entire capital of the banking sector and 90.5% of its total assets (the remaining portion of assets comprise the balance sheets of 12 branches of foreign banks that do not hold any capital in the Czech Republic). The stress tests were based on the principles and procedures used by the International Monetary Fund and the World Bank in missions of the Financial Sector Assessment Program (FSAP). Similar tests are conducted also by numerous foreign central banks.[122]

1. UPDATE OF BASIC STRESS TESTS WITH HISTORICAL SCENARIOS

As the first step in this exercise, the basic stress tests were updated. These basic tests are based on the methodology of two scenarios (scenario I and scenario II) representing two different types of stress. The values of the parameters in each scenario were set in the same way as in the previous Financial Stability Report in order to allow for comparisons. Scenario I consisted in the combination of a hypothetical increase in interest rates of 1 percentage point, a depreciation of the exchange rate of 15% and an increase in the share of non-performing loans (NPLs) of 30% by reclassification of loans. Scenario II uses the combination of an increase in interest rates of 2 percentage points, a depreciation of 20% and an increase in the share of NPLs in total loans of 3 percentage points. These scenarios take into account the prevailing international practice and the Czech conditions. In choosing the parameters, historical shocks were also taken into account, specifically the Czech Republic's experience in 1997–1999.

In the course of the stress testing exercise, the banks' portfolios were exposed to shocks. The 2005 year-end data were used. The results of the stress tests were compared with the results of the tests performed under the same methodology for the previous period starting from 2000. The stress tests followed the "bottom-up" methodology, i.e. they were implemented on the financial statements, regular reports and data of individual banks and subsequently aggregated for the entire banking sector.

The impacts of these two scenarios were assessed by comparing the capital adequacy ratio (CAR) before the hypothetical shocks (the pre-test CAR) and after the impact of the model shocks on the banks' portfolios (the post-test CAR, see Table 1).

119 Jaroslav Heřmánek, Czech National Bank (CNB); Martin Čihák, International Monetary Fund (IMF).

120 The basic stress test methodology, including the results of the impact of the shocks in scenarios I and II, was published, for instance, in the CNB's Financial Stability Report for 2004 (www.cnb.cz) and in Čihák and Heřmánek (2005) and Čihák (2004).

121 These issues are addressed in the article *Macroeconomic Credit Risk Model* in the thematic part of this Report.

122 The Czech Republic features among the countries that prepare stress tests comprising combined scenarios of macroeconomic factors, including interbank contagion analysis. A survey of the use of tests around the world and the testing methodology are included in International Monetary Fund (2005), (2003).

The initial capital adequacy ratio entering the stress tests[123] declined by 0.8 percentage point between the end of 2004 and December 2005. This decline in the capital adequacy ratio was due to the fact that some banks used retained profits for the payment of dividends and also to an increase in risk weighted assets. The modelled post-test capital adequacy ratio was 11.3% under scenario I and 10.2% under scenario II. Thus the hypothetical post-test capital adequacy ratio decreased in year-on-year terms by 0.7 percentage point for scenario I and by 0.2 percentage point for scenario II compared to the figures for the end of 2004. The fact that this year-on-year decline in the modelled post-test capital adequacy ratio was lower than the decline in the actual capital adequacy ratio prior to the application of the hypothetical shocks suggests that the banks' exposure to basic types of risk also declined. The post-shock capital adequacy ratio declined, but remained well above the 8% regulatory minimum for the banking system as a whole (see Chart 1).

For some banks, the post-test capital adequacy ratio could decline below 8 percent, and reaching this minimum again would require a capital injection by their owners. The effects of adverse changes would have a negative impact on the payment of dividends and bonuses for these banks.

The weight of individual risk factors changed in the period under review. In the context of an overall decline in risks, the negative impact of interest rate risk intensified (banks holding bonds to maturity would, conversely, reduce their credit risk exposure). Exchange rate risk had the opposite impact and the impact of credit risk stagnated. Some differences in the development of risks across the individual groups of banks can be identified. The large banks experienced a decline in their post-test CAR in both 2004 and 2005, but the banks are better prepared to absorb an adverse stress than previously under both scenarios. The small and medium-sized banks had an acceptable capital adequacy ratio even after the tests.

2. RESILIENCE TO AN INTEREST RATE SHOCK

Whereas the previous text presented the result of the model with a predefined shock size, including for the interest rate shock, the gradual stress approach may also be used. Under this approach, the maximum interest rate shock which the banking sector as a whole is capable of absorbing was examined. The effect of the stress induced by a gradual increase in the interest rate shock was examined in the result of scenario II, with the other parameters of the scenario remaining constant (see Chart 2). The banking sector was capable of absorbing the impact of an immediate increase in interest rates of up to 3.5–4 percentage points, especially if, under these adverse circumstances, the banks were to hold the 1-or-more-year bonds in their portfolios to maturity. For the estimated residual maturity[124] the robustness of the stress test would correspond to a parallel shift in the yield curve of up to 5 percentage points, without the capital adequacy ratio of the banking sector declining below 8%.

In scenarios I and II, the interest rate shock is modelled as a parallel shift in the entire yield curve. In reality, the yield curve may change its shape and slope. For instance, short-term rates may suddenly increase more than long-term rates, causing the yield curve to flatten, or expectations may arise of an increase in short-term interest rates in the near future concurrently with an assumption of stable long-term interest rates, which would result in a yield curve with a peak, and so on. The analysis of the impact of changes in the shape of the yield curve on the banking sector shows which interest rates the banks' portfolios are most sensitive to.

The hypothetical scenarios of changes in the shape of the yield curve, i.e. a twist, a change in peak and a parallel shift in the yield curve, were derived from extreme values of the historical variability of short-term, medium-term and long-term yields for the countries of the Central European region (the Czech Republic, Hungary, Poland and Slovakia) for the period 2000–2005. For instance, an analysis of short-term 3-month rates reveals that the maximum month-on-month change ranged between 40 (the Czech Republic) and 350 (Hungary) basis points. For our test, we used the average value (140 basis points). The other parameter values were derived in a similar way and are comparable to those used by other central banks (see Table 2).[125]

If we compare the sensitivity of Czech banks' portfolios to interest rate risk, the yield curve twist test would have bigger effect than the impact of a change in the peak of the yield curve, but it would be lower than the impact of a parallel shift in the yield curve in both scenario I and scenario II. The interest rate shock in scenario I does not go beyond the monitored historical variability in the Central European region in the period 2000–2005.

123 i.e. the actual capital adequacy ratio measured as the ratio of capital to risk-weighted assets of the banking sector.

124 Banking experts of commercial banks specify in their reports the estimated maturity of bonds and other financial instruments they are able to sell (or that will be redeemed) based on their estimates even prior to their formal contractual maturity.

125 Similar scenarios can be found in Deutsche Bundesbank (2005).

3. SIMPLE AND COMBINED INTERBANK CONTAGION TESTS

3.1 Interbank contagion test methodology

The interbank contagion stress tests are based on the exposures[126] described in section 4.4.4 *Interbank Relations*. The tests examine the extreme situation of one bank defaulting on its obligations to another bank or group of banks. This involves hypothetically capturing the impacts of contagion in the interbank market in the event of a bank's capital inadequacy. We test the extent to which banks are sensitive to interbank contagion risk and the banks' ability to cover by capital their own liabilities and outstanding claims vis-à-vis banks in default.[127]

The interbank contagion tests use as inputs data from exposure matrices (matrices of exposures between banks) for the banking and trading portfolios and loans and deposits received. Two testing methods are used to determine the net exposure of creditor and debtor banks. Under method 1, the test uses the greater of the values of assets and liabilities of interbank exposures that constitute the worst case scenario. This is the maximum outstanding amount over the entire duration of the contractual relations between the banks. Under method 2, the test uses uncollateralised loans and deposits received that represent the immediate outstanding amount from the exposures (their aggregate impact on banks is lower and so some of them are not reported separately in the summary of results of the individual tests). In the contagion tests the interbank exposure is re-assessed for each bank with respect to any other bank. Both tests use a 100% and 40% expected loss given default.

The interbank test is performed both as a simple test and as a combined test. Both tests are based on the same net exposures, but differ in whether or not they take into account the probability of default of individual banks.

The simple test examines the potential impact of the failure of each individual bank on the banking sector as a whole. This test does not examine the factors that might lie behind such a failure, whether it was caused by external factors or internal problems in the bank (for instance the failure of the bank's internal control systems). The test examines neither the probability of default of a particular bank nor whether the expected default is realistic. The test simply assumes that the bank will become insolvent ("primary insolvency") and stop meeting its obligations in the interbank market. The test consists in calculating how such a default may impact on other banks towards which this insolvent bank has uncovered liabilities. If one (or more) of these banks becomes insolvent ("secondary insolvency"), we need to perform a second iteration of the test and calculate how this secondary insolvency impacts on other banks in the system through their net uncovered credit positions vis-à-vis the banks facing secondary insolvency. If the test reveals that secondary insolvency leads to other banks becoming insolvent ("tertiary insolvency"), we need to perform a third iteration of the calculation and continue until this "domino effect" stops, i.e. until the insolvency induced in one bank or group of banks does not lead to the creation of other insolvent banks.

The simple interbank contagion test is composed of 24 sub-tests, one for each bank in the system. The difference between the pre-test and post-test CAR of the banking system may be viewed as a measure of the bank's systemic significance: the greater the decline in the CAR, the bigger the impact on the capital adequacy ratio of the banking sector if the bank fails and is no longer able to service its claims (borrowings) in the interbank market.

The second possible way of applying the simple test is to consider the largest creditor exposure for each bank. In this alternative, default by the debtor bank is assumed for each of the creditor banks and their largest creditor exposures. The losses given default on these largest exposures are reflected in the capital of each creditor bank. The sum of these hypothetical losses given default is incorporated into the overall post-test capital adequacy ratio (see Table 3).

The combined test uses a similar calculation method as the simple test, but takes into account the different probabilities of default of the banks. This test examines changes in the external environment, specifically a macroeconomic scenario that affects all banks simultaneously. Unlike the simple test, then, this method does not use 24 separate sub-tests, but just one integrated test in which the probability of insolvency is higher in banks that are more sensitive to changes in the economic environment. Unlike in the simple test, it is possible that primary insolvency will occur in several banks simultaneously. Another different feature of this test is that the subsequent calculations of contagion are performed in a system that is already weakened by the effects of the initial macroeconomic stress scenario (see Table 4).

126 Exposures here mean the mutual claims monitored in a report on exposures and over-limit deposits and loans received. These are the claims of one bank against another in both the banking portfolio (interbank loans) and the trading portfolio (holdings of bank bonds). The statement does not include all interbank claims, only those which exceed a particular share of the bank's capital.

127 A similar approach was taken by Degryse and Nguyen (2004). The issue of interbank contagion is discussed by Upper and Worms (2002).

Bank default can be modelled in stress tests in various ways. The simpler method that was used in the above simple interbank test is based on the assumption that banks with negative capital will default and, conversely, that banks with positive capital will not default. In practice, however, even banks with positive capital can fail. In order to make it more realistic, the combined test – unlike the simple test – also took into account the fact that the probability of default of banks with positive capital is not zero. It was assumed that this probability decreases with increasing capital of each of the individual banks (Table 5).[128] The iterative calculation of the "domino effect" is performed along similar lines as in the case of the simple test, i.e. as long as the new iterations result in some other bank in the test being included in a worse CAR group (i.e. a group with higher probability of default) or ceasing to receive capital.[129]

3.2 Results of interbank contagion tests

In the simple test, for most banks the effect of their loss of solvency on the rest of the banking sector was negligible (impacts of up to 1 percentage point on the sector's capital adequacy ratio). For some banks, the impact of insolvency of each individual bank on the sector's capital adequacy ratio was 3 percentage points on average. Nevertheless, for the majority of these banks the capital adequacy ratio after the simple test stayed above the required minimum of 8%; only in one case was it slightly lower. The banking sector reached equilibrium after the second iteration in the simple test.

In the second alternative of the simple test (assuming default on the largest exposure for each creditor bank) for the worst case scenario[130] the resulting capital adequacy ratio of the banking sector after interbank contagion was 6.7%. This test assumes relatively extreme adverse impacts of default compared to other similar tests. The system stabilised after the second iteration (see Table 3).

In the combined test with the scenario II shocks incorporated, the resulting capital adequacy ratio would be 9.7% and the loss due to interbank contagion would be 0.5 percentage point in the capital adequacy ratio. The maximum loss of the banks in default could reach 1.7% of the total capital in the banking sector. The system reached equilibrium after the third iteration (see Table 4).

4. MACRO STRESS TEST USING CONSISTENT MODEL SCENARIOS

The macro stress test is based on testing macroeconomic variables and related outputs from the macroeconomic forecasting model and the credit risk model. Shocks to different scenarios of development of the sector's financial stability are tested on data on the portfolios of individual banks as at the end of 2005. This tool is used to assess the impact of possible external shocks on non-performing loans (NPLs) in the banking sector.

Scenarios I and II used in the basic tests are essentially ad hoc scenarios in which the macroeconomic and prudential shocks mostly reflect historical values but are only loosely interlinked. Consequently, the next logical step in the development of stress testing of the Czech banking sector was a transition to model scenarios where the individual variables entering the stress tests on the input side (interest rates, the exchange rate and the share of NPLs) are interconnected in the macroeconomic model.

The model scenarios were generated in two steps. In the first step, several consistent macroeconomic scenarios were obtained using the CNB forecasting model. These scenarios capture the development of key macroeconomic variables (GDP, inflation, interest rates, the exchange rate, etc.) in the near future and – except for the baseline scenario – reflect the response of the economy to an external shock or combination of macroeconomic shocks. In this way the first two main inputs to the stress testing were obtained, i.e. expected interest rates and the exchange rate.

In the second step, the macroeconomic credit risk model was used to estimate the expected evolution of NPLs in banks' portfolios based on the expected development of macroeconomic indicators (GDP growth, inflation and interest rates).[131] As the main output of the macroeconomic credit risk model is the quarterly change in NPLs, and given that the stress testing works with growth in NPLs over a one-year time horizon, it was necessary to annualise the results of the credit risk model.[132]

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128 The calculation of the expected loss E = Exp*LGD*PD, where Exp stands for the amount of the bank's exposure, LGD denotes the expected loss given default (100% or 40%) and PD stands for the probability of default of the bank. The probability of default parameters were calibrated based on experience from abroad.

129 A similar interbank exposure testing method is given in International Monetary Fund and World Bank (2003).

130 This test assumes a 100% loss given default (LGD) using method 1.

131 This model is described in the following article *Macroeconomic Credit Risk Model*.

132 This annualisation was performed as follows: The annual change in NPLs was estimated for four successive estimates of the quarterly default ratio, which were then summed. The dampening effect of monetary policy could thus manifest itself in the shock scenarios in the second to fourth quarters.

The baseline model scenario uses the official CNB forecast of April 2006 and serves as an estimate of the probable development of the Czech economy. The stress test results are consistent with this approach, as the official CNB forecast does not envisage any significant shocks for the period ahead. Besides the baseline model scenario, three alternative scenarios (A, B and C) were proposed which reflect less probable, but still plausible shocks. The shocks in these scenarios take into consideration the history of real economic growth and its links to other macroeconomic variables.

Baseline scenario

The baseline scenario is derived from the April CNB forecast[133], which expects real GDP growth of 6.1% in 2006 and 5.4% in 2007. Inflation will be below 3% in 2006 and edge up to 3.4% in 2007. Growth in regulated prices, changes to indirect taxes and a rise in inflation expectations will be the major factors contributing to the rise in inflation. Consistent with the forecast is interest rate stability initially and a gradual rise in rates thereafter.

The baseline scenario does not contain any risks that would pose an immediate threat to the financial sector and its stability. Low interest rates, the positive outlook for investment activity and GDP growth will further boost growth in lending to households and corporations. The low interest rate differential will prevent growth in debt in foreign currencies.

Alternative scenario A

Alternative scenario A analyses the potential response of the domestic economy to a significant global negative shock.[134] Such a shock might hypothetically occur in a situation where global imbalances associated with a loss of confidence in the main economic zones suddenly correct and interest rates of the main world currencies, i.e. the dollar and the euro, rise rapidly. The scenario also includes a large downturn in global economic activity and inflation, further intensified by a strong monetary restriction. The downturn in the economic activity of the Czech Republic's major trading partners would have a relatively sizeable impact on its macroeconomic situation and exports. GDP growth rates in 2006 and 2007 would be about 1–2 percentage points lower than in the case of the baseline scenario, and interest rates would be considerably higher.

The impact of alternative scenario A on the stability of the financial system would to some extent depend on the distribution of the decline in GDP across the individual sectors of the economy. In any event, however, it would influence the ability of economic agents to service their debts. The increase in interest rates would amplify this effect and would have an adverse impact on banking portfolios.

Alternative scenario B

Alternative scenario B combines the effect of two factors, the development of the nominal exchange rate and the development of inflation. The scenario assumes a sudden appreciation of the exchange rate and a negative supply shock (for instance, a poor harvest or some other shock to the supply of market goods and services) that would, ceteris paribus, result in a rise in prices. However, the stronger exchange rate would cause a slight decline in inflation and GDP growth compared to the baseline scenario. The monetary policy response would be to cut interest rates to a very low level.

The impact of alternative scenario B is, by contrast with the previous option, rather more favourable. The decline in GDP growth is temporary, and although disposable income falls, the monetary policy easing reduces the loan repayment burden, at least insofar as it allows debtors to swap their rates for lower ones. The decline in interest rates also means less pressure on banks' portfolios, although it might lead to lower interest margins and hence might also reduce banks' profitability.

Alternative scenario C

Alternative scenario C reflects the potential risks associated with a possible drop in domestic demand and assumes a gradual decline in GDP growth between 2006 Q2 and 2007 Q1. A drop in domestic demand, and hence also in economic activity, might be caused, for instance, by a sharp decline in corporate investment activity in a situation of investment outflows due to cost optimisation. This would lead to growth in unemployment and a fall in household consumption. A strong fiscal restriction might also foster a drop in domestic demand.

133 A detailed description of the CNB macroeconomic forecast is given in CNB Inflation Report (2006), available from www.cnb.cz.

134 The global negative shock should be generated in a global economic model describing a realistic and consistent trajectory for foreign interest rates, inflation, economic activity and, where appropriate, the cross-exchange rate. In this scenario, this is not the case. For reasons of simplicity and in order to achieve a really strong shock, a significant shock to euro area interest rates, German GDP and inflation is assumed.

A negative shock to GDP growth would cause the output gap to widen and inflation to fall. The monetary policy response would be a significant easing, which would help to revive economic activity, in particular in 2007. The lower interest rates compared with other countries would also foster a slight depreciation of the exchange rate, which, in turn, would further ease the monetary conditions.

Scenario C is a highly imperfect picture of the impact of an outflow of direct foreign investment on the Czech economy, since any major outflow would probably have more permanent implications for the structure of the economy, potential output and export performance, which monetary policy would be unable to reverse in just one or two years. However, it may serve as the first step in the analysis of the Czech economy's dependence on foreign direct investment for the purposes of assessing the impact on financial stability.

Test results for the model scenarios

The capital adequacy ratio in the baseline scenario would be 11.6% in 2006 (on the December 2005 banking sector data). The share of new non-performing loans in the given volume of claims would be 3.7%. The capital adequacy ratio would be 2 percentage points lower in scenario A, at the same level in scenario B and 0.1 percentage point lower in scenario C than in the baseline scenario for 2006. The new non-performing loans of the banking sector in the pessimistic scenarios A, B and C would be 4.2%, 4.4% and 5.2% respectively at the one-year horizon (see Chart 3 and Chart 4).

5. CONCLUSIONS

The resulting post-test capital adequacy ratio of the banking sector was above 8%, except in one simple test, which, however, was based on relatively extreme assumptions. The banking sector as a whole proved to be essentially resilient to the effects of the macroeconomic and prudential shocks, with some banks showing greater sensitivity to interest rates and interbank contagion. The banking sector was capable of withstanding the stress of shocks, including movements in exchange rates, in model scenarios simulated as alternatives to the baseline macroeconomic scenario.

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Tab. 1 – Summary of results of stress tests, 2004–2005: Banking sector
(data in % unless stated otherwise)

	December 2004	June 2005	December 2005
Pre-test CAR [1]	**12.6**	**13.0**	**11.9**
… large banks	11.2	11.8	10.8
… medium-sized banks	16.8	16.6	15.4
… small banks	18.9	17.3	15.4
Scenario I			
Total effect of shocks (percentage points)	-2.3	-2.2	-1.9
Interest rate shock	-1.6	-2.0	-1.7
Exchange rate shock	1.0	1.5	1.4
Credit shock	-1.7	-1.7	-1.6
… of which indirect effect of exchange rate shock	-1.1	-1.0	-1.0
Profit allocation (percentage points) [2]	1.7	1.4	1.3
Post-test CAR	**12.0**	**12.2**	**11.3**
… large banks	11.2	11.8	10.8
… medium-sized banks	15.2	14.9	14.0
… small banks	17.0	16.0	14.7
Capital injection (percentage of GDP) [3]	0.04	0.12	0.1
Share of banks with negative capital after shock [4]	0.0	1.1	1.2
Impact on dividends and bonuses [5]	-53.9	-77.5	-81.2
Scenario II			
Total effect of shocks (percentage points)	-5.0	-5.0	-4.4
Interest rate shock	-3.3	-4.0	-3.5
Exchange rate shock	1.4	2.0	2.0
Credit shock	-3.1	-3.0	-2.8
… of which indirect effect of exchange rate shock	-1.5	-1.4	-1.3
Profit allocation (percentage points) [2]	2.8	2.6	2.7
Post-test CAR	**10.4**	**10.6**	**10.2**
… large banks	10.2	10.8	10.3
… medium-sized banks	13.5	13.2	12.2
… small banks	15.5	14.9	13.9
Capital injection (percentage of GDP) [3]	0.5	0.6	0.5
Share of banks with negative capital after shock [4]	10.7	5.9	5.4
Impact on dividends and bonuses [5]	-95.3	-100.0	-100.0

Notes:
1) CAR: capital adequacy ratio, defined in accordance with the relevant CNB regulations (in particular those governing the capital adequacy of banks and other prudential rules).
2) Both scenarios assume that in the absence of shocks each bank would generate profit (loss) equal to the average for the previous five years and that it would use any profit as a first line of defence against a reduction in its CAR.
3) The capital needed to ensure that each bank in the system has a post-test CAR of at least 8%.
4) Market share of banks with negative capital following the assumed shocks (as a percentage of total assets).
5) As a percentage of dividends and bonuses of the previous calendar year.

Tab. 2 – Comparison of the effect of a change in the interest rate

Tested portfolios Scenarios Shape of yield curve		Short-term up to 1 year	Medium-term 1 - 5 years Change in basis points (+)	Long-term over 5 years	Interest rate shock 2005 % of CAR
Twist		140	70	40	-1.28
Change in peak		0	60	0	-0.20
Parallel shift	Scenario I	100	100	100	-1.72
	Scenario II	200	200	200	-3.46

Tab. 3 – Summary of results of simple interbank contagion test, 2005
Contagion test for each bank after default by another bank (with no link to macroeconomic stress testing)

Method	Actual values [1]	Method 1: Exposure (Ab+Ao-P)		Method 2: Exposure (-P)	
Expected loss given default (LGD)	~20%	40%	100%	40%	100%
Capital adequacy ratio (CAR)	pre-test	post-test	post-test	post-test	post-test
CAR					
Average (weighted)	11.9	9.8	6.7	10.7	9.0
Average (non-weighted)	22.6	14.7	6.5	16.8	11.0
Median	12.4	8.1	5.9	10.5	8.4
Number of banks	24	24	24	24	24
with CAR < 0%	0	2	5	1	2
with CAR < 8 %	0	12	15	6	10
with CAR < 10 %	6	13	17	10	14
Share of banks with CAR < 0 % (banks in default)					
total banks' net exposure in the sector's assets	x	0.2	1.5	0.1	0.5
loss on banks' net exposure in the sector's capital [2]	x	-1.8	-8.3	-1.4	-5.4
loss on banks' net exposure in the sector's assets [2]	x	-0.1	-0.5	-0.1	-0.3
total share of banks' assets in the sector's assets	x	1.7	7.3	0.7	3.6

Notes:
1) Under a CNB Decree. this involves coverage of the net credit exposure risk and inclusion of the trading portfolio exposure. The sources of the data are banks' reports submitted on a regular basis to CNB Banking Supervision, including large exposures and over-limit exposures of the banking and trading portfolios between resident banks.
2) Sum of losses of creditor banks on the largest (net) exposure given default by each debtor bank.
Ab – banking portfolio exposure (assets)
Ao – trading portfolio exposure (assets)
P – loans and deposits received (liabilities)

Tab. 4 – Summary of results of the combined (macro) stress test for interbank contagion, 2005
Contagion test for each bank with incorporated probability of default of the bank and link to macroeconomic stress testing

Stress test		Scenario I		Scenario II	
Method	Actual values [1]	Method 1: Exposure (Ab+Ao-P)		Method 1: Exposure (Ab+Ao-P)	
Expected loss given default (LGD)	~20%	40%	100%	40%	100%
Capital adequacy ratio (CAR)	pre-test	11,3 post-test	11,3 post-test	10,2 post-test	10,2 post-test
CAR					
Average (weighted)	11.9	11.1	10.8	10.1	9.7
Average (non-weighted)	22.6	18.8	17.6	9.0	6.9
Median	12.4	10.3	9.6	8.8	8.1
Number of banks	24	24	24	24	24
with CAR < 0 %	0	1	1	3	5
with CAR < 8 %	0	9	9	11	12
with CAR < 10 %	6	11	12	14	14
Share of banks with CAR < 0 % (banks in default)					
total banks' net exposure in the sector's assets	x	0.0	0.1	0.2	0.5
loss on banks' net exposure in the sector's capital [1]	x	0.0	-0.1	-0.2	-1.7
loss on banks' net exposure in the sector's assets [1]	x	0.0	0.0	0.0	-0.1
total share of banks' assets in the sector's assets	x	1.0	1.0	4.2	7.9

Notes:
1) Sum of losses of creditor banks on (net) exposures given default by debtor banks.

Tab. 5 – Explicit combination of capital adequacy ratio and probability of default of the bank in interbank contagion stress testing

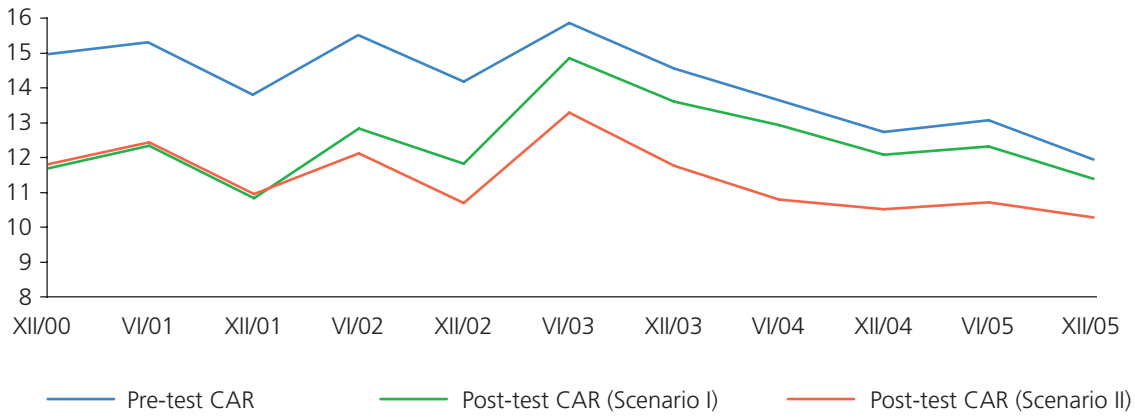
CAR	Probability of default (PD)
< 0 %	100%
0 – 5 %	25%
5 – 8 %	15%
8 – 10 %	5%
> 10 %	0,5%

Tab. 6 – Summary of results of stress tests, 2005: Banking sector
(data in % unless stated otherwise)

Scenario type	Baseline	Scenario A	Scenario B	Scenario C	Scenario I	Scenario II
Pre-test CAR [1]	**11.9**	**11.9**	**11.9**	**11.9**	**11.9**	**11.9**
… large banks	10.8	10.8	10.8	10.8	10.8	10.8
… medium-sized banks	15.4	15.4	15.4	15.4	15.4	15.4
… small banks	15.4	15.4	15.4	15.4	15.4	15.4
Results for the chosen scenario type						
Total effect of shocks (percentage points)	-2.0	-5.2	-1.7	-1.7	-2.0	-4.9
Interest rate shock	0.0	-2.8	1.4	1.0	-1.7	-3.5
Exchange rate shock	0.0	0.4	-0.7	0.2	1.4	2.0
Credit shock	-1.9	-2.4	-2.2	-2.7	-1.6	-2.8
… of which indirect effect of exchange rate shock	0.0	-0.3	0.0	-0.1	-1.0	-1.3
Interbank contagion [2]	-0.2	-0.4	-0.2	-0.2	-0.2	-0.5
Profit allocation (percentage points) [3]	1.7	2.9	1.5	1.3	1.4	2.8
Post-test CAR	**11.6**	**9.6**	**11.6**	**11.5**	**11.2**	**9.7**
… large banks	10.8	9.1	10.7	10.8	10.8	10.0
… medium-sized banks	14.6	13.4	14.4	13.9	14.0	12.1
… small banks	14.6	13.9	14.2	14.0	14.6	13.5
Capital injection (percentage of GDP) [4]	0.0	0.6	0.0	0.1	0.1	0.6
Share of banks with negative capital after shock [5]	0.0	9.0	0.0	0.0	1.2	10.1
Impact on dividends and bonuses [6]	-91.9	-100.0	-66.9	-50.2	-82.8	-100.0

Notes:
1) CAR: capital adequacy ratio, defined in accordance with the relevant CNB regulations (in particular those governing the capital adequacy of banks and other prudential rules).
2) Test integrated with the interbank contagion for Method 1, expected level of loss given default (LGD) 100% and chosen probability of default of the banks on the basis of the CAR.
3) Both scenarios assume that in the absence of shocks each bank would generate profit (loss) equal to the average for the previous five years and that it would use any profit as a first line of defence against a reduction in its CAR.
4) The capital needed to ensure that each bank in the system has a post-test CAR of at least 8%.
5) Market share of banks with negative capital following the assumed shocks (as a percentage of total assets).
6) As a percentage of dividends and bonuses of the previous calendar year.
Scenarios: baseline, A, B and C are based on the macroeconomic forecasting model of the Czech National Bank and the credit risk model.
Scenario I and Scenario II are based on the chosen hypothetical and historical shocks (see the methodology in the Financial Stability Report for 2004).
They differ from the results set out in Table 1 since they include the effect of interbank contagion.

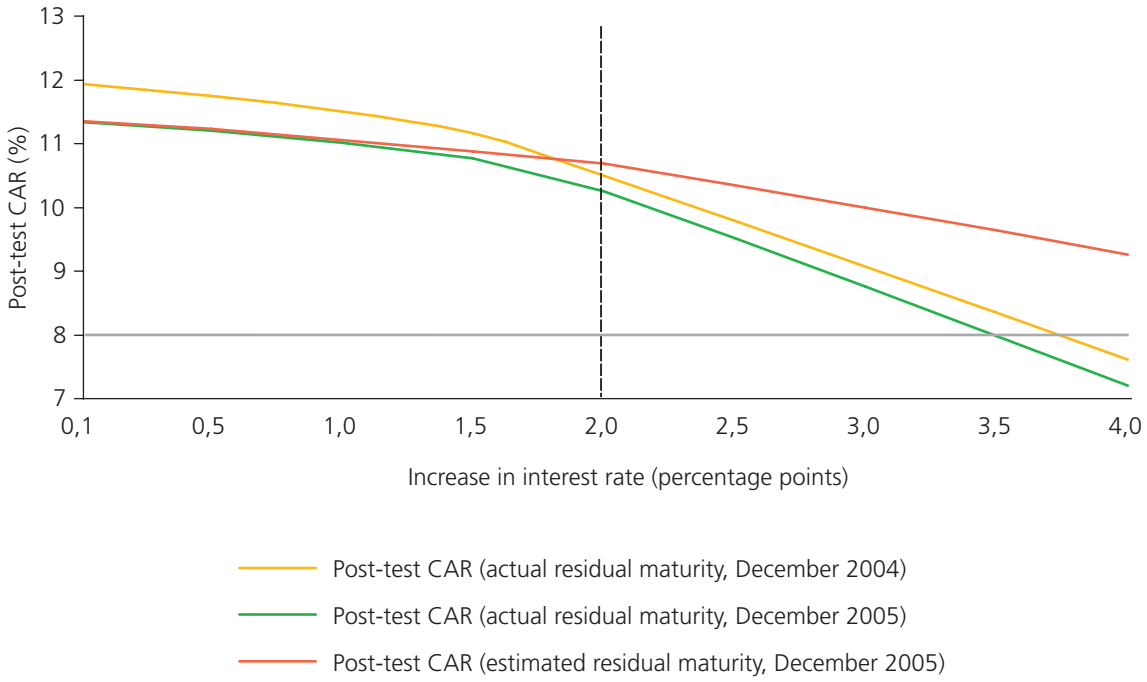
CHART 1 – Results of stress test scenarios for the banking sector of the Czech Republic
(capital adequacy; %)



Note: The scenarios differ due to the fact that they use different methodologies for the growth in non-performing loans (NPLs), hence the resulting CAR for each scenario develops differently over time for each scenario.

Source: **CNB – single methodology for stress testing 2005**

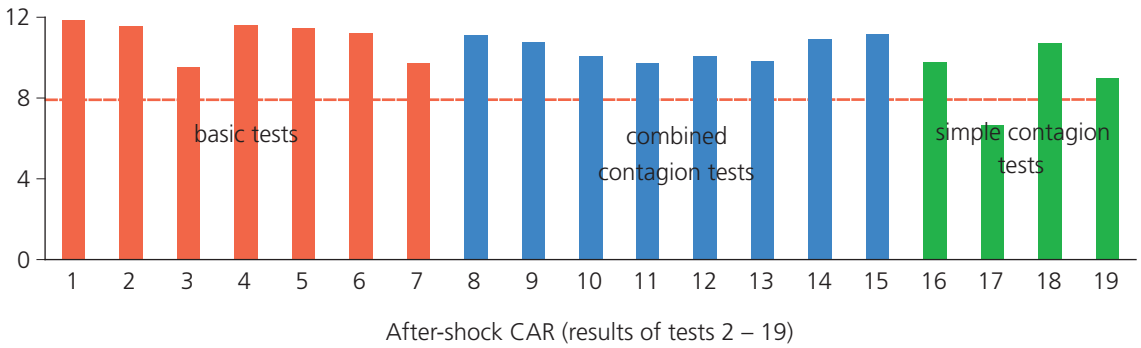
CHART 2 – Robustness of the stress test under scenario II for the interest rate shock
(capital adequacy; %)



Note: Estimated residual maturity is based on estimate of banking experts of individual commercial banks.

Source: **Calculation based on CNB data**

CHART 3 – Capital adequacy in individual tests
(%)

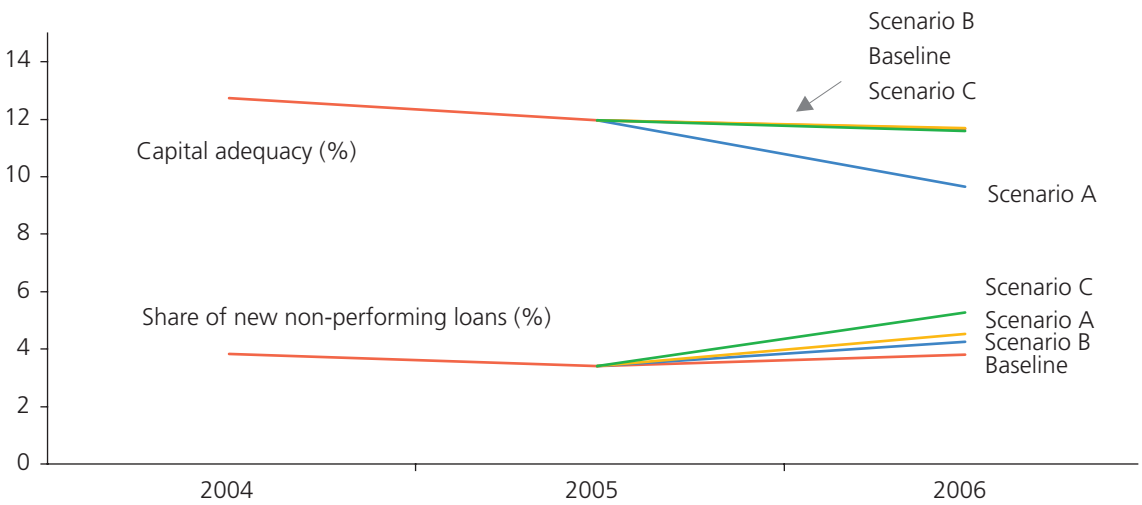


Explanatory notes:
1 – Pre-test CAR
2 – Baseline scenario
3 – Scenario A
4 – Scenario B
5 – Scenario C
6 – Scenario I
7 – Scenario II
8 – combined, scenario I, 40% LGD, method 1
9 – combined, scenario I, 100% LGD, method 1
10 – combined, scenario II, 40% LGD, method 1
11 – combined, scenario II, 100% LGD, method 1
12 – combined, scenario II, 40% LGD, method 2
13 – combined, scenario II, 100% LGD, method 2
14 – combined, scenario II, 100% LGD, twist of the yield curve
15 – combined, scenario II, 100% LGD, peak of the yield curve
16 – simple, 40% LGD, method 1
17 – simple, 100% LGD, method 1
18 – simple, 40% LGD, method 2
19 – simple, 100% LGD, method 2

Simple – interbank contagion test for each bank after default by another bank (no link to macroeconomic stress testing).
Combined – interbank contagion test for each bank with incorporated probability of default of the bank and link to macroeconomic stress testing.
Method 1 – interbank exposures representing maximum outstanding amount over the entire duration of interbank contractual relations.
Method 2 – interbank exposures representing immediate outstanding amount on exposures.

Source: **Calculation based on CNB data, December 2005**

CHART 4 – Results of scenarios of macro stress testing



Note: The share of new non-performing loans (NPLs) is related to the given volume of loans at the end of 2005.

Source: **CNB**

MACROECONOMIC CREDIT RISK MODEL[135]

1. INTRODUCTION

As mentioned in this Report, credit risk – despite having declined – remains the main risk to financial stability in the Czech Republic. At the level of individual debtors, credit risk depends primarily on the individual characteristics of those debtors (financial results, ability to repay, age, income, etc.), while at the systemic level, credit risk can be expected to develop cyclically depending on the evolution of key macroeconomic indicators.

This article focuses on the macroeconomic default rate model in the Czech economy. The aim is to produce a model allowing us to estimate the expected proportion of bad loans in the total loan portfolio of banks in response to the evolution of key macroeconomic indicators. The proportion of bad loans is one of the inputs to the stress testing model developed by the CNB.[136] It has so far been regarded as a constant parameter estimated from extreme historical events. The new approach enables modelling of the impacts of various macroeconomic shocks on loan portfolio quality and subsequently, in combination with the stress-testing system, on the capital of the entire banking system. Such shocks may be set either expertly on the basis of historical experience or constructed in the form of alternative scenarios linked to the CNB's main macroeconomic forecasting model.

The article is structured in the following way. Section 2 gives a brief summary of the possible theoretical approaches to credit risk modelling and also notes the approaches to this issue applied by other central banks. Section 3 discusses the time series used to estimate the model. Section 4 describes the results of the model applied to the Czech economy. The next section focuses on the application of the outputs of the model for stress testing. The conclusion sums up the results achieved and discusses other possible areas of development of credit risk modelling in the Czech Republic. The article also includes a technical annex which presents a description of the theoretical assumptions and the derivation of the econometric model used.

2. CREDIT RISK MODELS

2.1. Basic approaches to credit risk modelling

There are two main classes of models in credit risk modelling. The first type, which aims to estimate the risk profiles of individual debtors and is applied mainly in the everyday work of commercial banks, can be described as an individual credit risk model. Even within these models banks may include macroeconomic indicators among the explanatory variables in order to avoid the problem of pro-cyclical credit risk assessment.[137] Outputs from individual credit risk models can be used for calculating banks' capital requirements under the Internal Ratings Based approach (IRB) of the New Basel Capital Accord (NBCA),[138] which will be binding as from 2007.

This article makes use of the other type of credit models based on macroeconomic credit risk modelling. These models aim to estimate changes in credit risk at the aggregate level; they are therefore used for evaluating systemic risk or for evaluating financial stability in the economy.

Three main approaches are used within macroeconomic credit risk models. These approaches are based methodologically on models of individual risks. The first, traditional and frequently used view is based on finding an empirical relationship between a dependent variable representing loan portfolio quality and key macroeconomic indicators.[139] The transmission channel between macroeconomic indicators and the credit risk indicator is relatively difficult to trace. The second approach works with more advanced models based on structural models of individual risk, which are grounded on a microeconomic explanation of the creation of credit risk.[140] The third method for modelling credit risk is to apply "reduced models", which use data on the market prices of corporate bonds and shares as inputs. The advantage of this third type of model is the use of information hidden in such prices. However, these models are of little use for credit risk analysis in the Czech Republic, given its underdeveloped capital market.

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135 Petr Jakubík, CNB.

136 The stress testing methodology is described in detail in Čihák and Heřmánek (2005).

137 That is, the problem where the credit risk of a single entity would be assessed in positive terms during a period of economic growth and in negative terms during a period of economic slowdown. Credit risk models which would fail to address the issue of pro-cyclicality might result in a further strengthening of the economic downturn.

138 See Gordy (2003) and Finger (2001); a single factor model was used to calibrate risk weights for the purposes of BASEL II (probability of default, correlation of debtors' assets for individual risk classes). Applications of the model to the German economy can be found, for example, in Rösch (2003) or Hamerle, Liebig and Scheule (2004).

139 Empirical models of credit risk are discussed, for example by Bunn, Cunningham and Drehmann (2005), Deutsche Bundesbank (2005), Babouček and Jančar (2005) and Virolainen (2004).

The second approach was chosen to develop a model for the purposes of stress testing in the CNB. The aim was to estimate the potential future development of bad loans in banks' portfolios in response to changes in the macroeconomic environment. The approach chosen by the CNB is based on a Merton-type model[141], which models a debtor's default as an event occurring if the return on his assets falls below a certain threshold. An assumption was made for the model that the threshold depends on macroeconomic variables. The threshold is most probably lower in recessions and higher in booms. This model furthermore assumes that the value of the return depends, in addition to observed factors, on unobservable (latent) factors which can be explained microeconomically and which are assumed to have particular distributions.[142]

2.2 Credit risk models in other central banks

Most central banks employ some form of sensitivity analysis or stress testing, but only a few of them use a macroeconomic credit model. Where central banks do use such macroeconomic credit models, they are mostly empirical-type models, as, for example, in the case of the United Kingdom, Germany, Belgium and Finland. The Bank of England uses an empirical model[143] which estimates the bankruptcy rate of non-financial corporations and the default rate in the mortgage and credit card portfolios. The outputs generated in this manner are then entered into credit loss estimation models as explanatory variables. The default rates are estimated from real GDP, the real interest rate, unemployment, the corporate debt ratio and other aggregate indicators. Finland uses a macroeconomic model based on logistic regression[144] which explains the default rate relationship for individual sectors of the economy using macroeconomic indicators.[145] This model regards real GDP, nominal interest rates and the debt ratios of the individual sectors investigated as the explanatory variables. The default rate is modelled using the bankruptcy rate of companies in the total number of companies for the given sector of the economy. The Hungarian central bank is also preparing a credit model which uses the number of bankruptcies of companies for individual sectors of the economy, based on the approach employed by the Finnish central bank. Germany used a regression model estimated on a panel of German banks. The dependent variable here is a logistic transformation of the proportion of provisions in the credit portfolio. This model works with the change in the risk-free interest rate, GDP growth and loan portfolio growth as the macroeconomic indicators in the role of explanatory variables.[146] The Belgian central bank uses a model based on logistic regression estimating the aggregate default rate of the corporate sector. The output gap, nominal long-term interest rates and the lagged rate of aggregate corporate default are used as the explanatory variables. Generally speaking, the development of macroeconomic credit risk models has become an important area of interest of central banks as institutions pursuing financial stability. However, the topic associated with these models is undergoing very rapid development and there is no overall consensus on which model is the best.

3. DATA USED

Quarterly data for the Czech economy have been used for all calculations. The model is based on time series of bad loans and selected macroeconomic indicators.

3.1. Bad loans

The (dependent) credit risk variable or default variable estimated in the model can be defined in several ways. A default event is commonly defined as payment delinquency. A 12-month default probability is usually employed in credit risk assessments. This is defined for a given moment as the probability of a default event occurring in a 12-month period following that given moment, provided that the given person did not default in the period immediately preceding the given moment. This definition thus corresponds to new default events in the economy.

140 Structural models are addressed, for example, by Jakubík (2006).

141 Merton-type models are based on option pricing models, which estimate the value of a company as a price of a put option. This idea was discussed for the first time in Merton (1974).

142 Only one unobservable factor was considered for the purposes of the estimate, so the model is referred to as one-factor. A detailed and more technical description of the approach used can be found in the Annex.

143 A description of the macroeconomic credit risk model used by the Bank of England can be found in Bunn, Cunningham and Drehmann (2005).

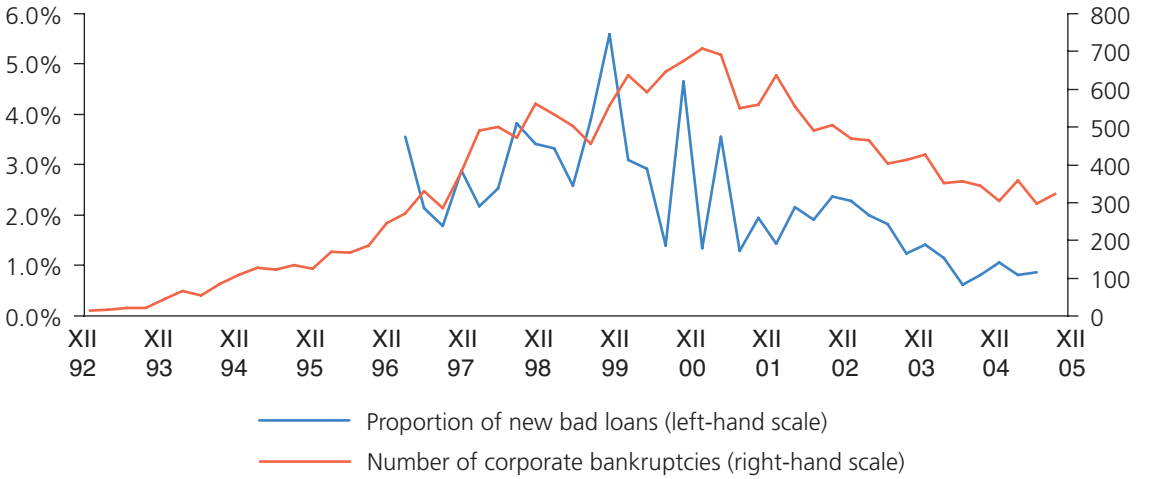
144 The regressive logistic model corresponds to a linear regression applied after logistic transformation of the dependent variable. The logistic transformation of the dependent variable y corresponds to $\ln \frac{y}{1-y}$. For credit models, this expression transforms the original value from the interval [0;1] to values from the entire real axis.

145 The macroeconomic credit risk model for the Finnish economy is described in Virolainen (2004).

146 The macroeconomic model of aggregate corporate default is discussed in National Bank of Belgium (2005).

In our model, the default rate was modelled by the proportion of new bad loans in the total volume of loans in the economy.[147] Quarterly time series of new bad loans were available from 1997 Q1 to 2005 Q3. They were, however, affected by one-off measures entailing reclassification of outstanding mortgage-backed loans in 1999–2001.[148] This period saw significant deviations in the calculated proportion of newly classified loans in the banking portfolio. However, this reclassification did not in fact change the true quality of these portfolios and can be seen as a way of making the indicator of the stock of classified loans more realistic.

CHART 1 – Corporate default rate
(quarterly data)



Source: **CNB, Ministry of Justice of the Czech Republic**

The special (dummy) variable used took a value of 1 for quarters when the monitored indicator saw significant deviations from the observed trend. The quarters include 1999 Q3, 1999 Q4, 2000 Q4 and 2002 Q2. In other cases, this variable takes the value of 0. The dummy variable so defined corresponds to the effect of changes in the approach to loan classification.

An alternative approach to approximating the default rate in the economy is to use time series of the number of adjudicated bankruptcies or compositions. This approach has been used, for example, to estimate the macroeconomic credit risk model of the Finnish economy.[149] For the Czech Republic, such data have been available since the start of the transformation. However, they have probably had a higher information content only since the late 1990s.[150] The quarterly development of the number of adjudicated bankruptcies in the Czech Republic is demonstrated in Chart 1. In practice there seems to be a lag between the filing of a petition for bankruptcy and the actual adjudication, and the default event in the loan portfolio usually precedes the adjudication of bankruptcy. The application of such time series for the Czech economy may also be limited by the frequent amendments made to the relevant legislation.[151] Given these facts, the time series of bankrupts in the end was not used to estimate the macroeconomic credit model for the Czech economy. Nevertheless, Chart 1 confirms the similar development of this time series and the share of growth in classified loans in the loan portfolio.

147 That is, loans which became "bad" in the given quarter. The moment of default means the time when the loan was classified as substandard or worse for the first time. Shifts within the "bad" loans category (for example, a further downgrading of the loan from doubtful to loss) will not affect the default rate according to this definition. This variable does not correspond to the proportion of total classified or non-performing loans, which are not an optimum measure of credit risk as they may include loans which were first classified a very long time ago and which remain in the loan portfolio, for example, for accounting purposes and are not related to the current economic situation.

148 CNB Provision of 17 September 1997 stipulating the principles for classifying loan receivables and for provisioning for these receivables, as amended.

149 Macroeconomic models of the credit risk of the Finnish economy using the number of corporate bankruptcies can be found in Virolainen (2004) and Jakubík (2006).

150 The time series of bankruptcies shows that the number of bankruptcies at the start of the 1990s was very low, probably as a result of inadequate legislation.

151 Legislative aspects are discussed in detail in the following article *The Impact of Insolvency Law on Financial Stability* in the thematic part of this report.

3.2. Macroeconomic indicators considered

Various macroeconomic indicators are used as explanatory variables relating to the indicator of the default rate in the economy. Interest rates and gross domestic product are most commonly considered in this context.[152] Gross domestic product (GDP) is a basic indicator of the cyclical position of the economy. A decline or low growth in GDP affects credit risk, for example via negative effects on corporate earnings, wage growth, unemployment or prices of assets (such as real estate), which, in turn, leads to a deterioration in loan portfolio quality. A rise in interest rates affects the loan portfolio in a similar way, increasing the costs of corporate and household financing, decreasing the market value of assets, etc.

In the case of GDP, annual real GDP growth was applied. One-month and one-year PRIBOR interbank rates were considered as nominal interest rates. Real interest rates[153] were deflated ex post by the consumer price index. The real effective exchange rate and the nominal koruna-euro and koruna-dollar rates were also considered among the explanatory variables. They are important for credit risk given the nature of the Czech economy as a small open economy where the financial condition of the corporate sector in particular strongly depends on the exchange rate. The last indicator used was the level of indebtedness of the economy, measured by the ratio of client loans to GDP, which approximates the exposure of the financial sector to the rest of the private sector.

In selecting the set of macroeconomic indicators, the issue of the interpretability of the results obtained was also taken into account. Emphasis was put on obtaining the relationship between credit risk, represented by growth in bad loans in the banking portfolio, and the macroeconomic indicators which already enter the stress testing scenarios.[154] Another partial limitation on the selection of the variables was the effort to link this credit risk model to the results of the CNB's macroeconomic forecast.[155]

4. ESTIMATION OF THE MODEL

Taking into account the criteria for the selection of variables relating to the stress testing scenarios and the outputs of the CNB's macroeconomic forecast, we selected the statistically best model containing GDP, the nominal interest rate, inflation and the dummy variable for the purposes of a change in methodology with a subsequent one-off impact on reclassification of the loan portfolio. In the case of GDP, non-lagged annual real GDP growth was used. The statistically most significant interest rate was the nominal 1Y PRIBOR lagged by four quarters. In the case of inflation, the annual rate of growth of the average quarterly CPI lagged by two quarters was the most significant. The model was also tested without the dummy variable. This gave very similar results, although it slightly overestimated the default rate at the end of the period under review, showing that the chosen model has some degree of robustness.

Table 1 shows the results of the estimated model.[156] All the estimates were significant at least at the 5% confidence level. The default rate in the economy is negatively related to gross domestic product, hence higher GDP growth leads to lower credit risk. By contrast, the level of credit risk is positively related to interest rates, which is also consistent with economic intuition. Including inflation in the model reduces the effect of nominal

Tab. 1 – Model of the default rate in the economy

Description of variable corresponding to estimated coefficient	Denoted by	Estimate	Standard error	Pr>|t|
Constant (β_0)	c	-2.0731	0.1019	<0.0001
Gross domestic product (β_1)	hdp	-4.9947	1.9613	0.0162
Nominal interest rate (β_2)	R_{t-4}	2.7839	0.9076	0.0045
Inflation (β_3)	π_{t-2}	-2.4364	1.0994	0.0344
Dummy (β_4)	dum	0.3296	0.0663	<0.0001
Effect of latent factor (ρ)		0.0121	0.0032	0.0008

Source: CNB

152 For a discussion of the issue of explanatory macroeconomic indicators, see, for example, Virolainen (2004), Deutsche Bundesbank (2005), Rösch (2003) and Jakubík (2006).

153 An internal CNB calculation based on CPIs and continuous weights corresponding to the average previous annual trade turnover was used to calculate the real exchange rate.

154 These indicators thus affect the resulting capital adequacy in the stress testing through two channels. The first acts directly via their effect on banks' balance sheets, while the other operates indirectly via the estimate of credit risk.

155 The results of the CNB's macroeconomic forecast are regularly discussed in the Inflation Reports published quarterly by the CNB.

156 See the Annex for the technical specification of the model used.

interest rates lagged by four quarters by real inflation lagged by two quarters. For this reason, the estimate of the coefficient representing inflation in the model is negative. The combination of nominal interest rates and inflation demonstrates that the credit default rate in the Czech economy depends on real interest rates rather than nominal rates, although the estimated coefficients are not exactly the same and have different lags. The statistical significance of the effect of the unobservable component shows that this factor is still necessary for explaining the dependent variable, despite the inclusion of macroeconomic indicators.[157] This result implies that the default rate in the economy is also affected by other factors than macroeconomic indicators.

The estimated form of the functional relationship for the development of the default rate in the economy is provided by equation (1).[158]

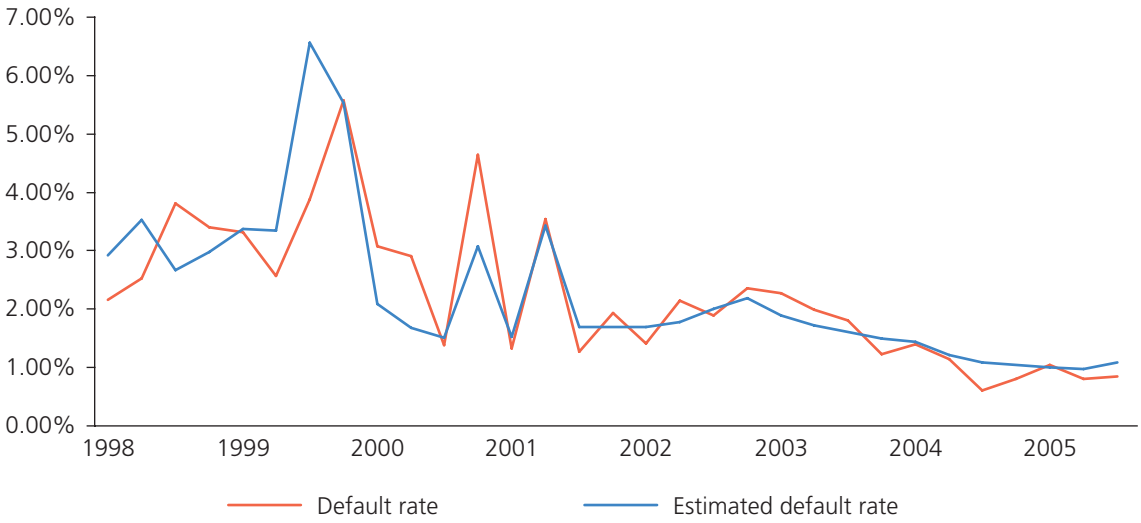
$$df_t = \phi(-2{,}0731 - 4{,}9947hdp_t + 2{,}7839R_{t-4} - 2{,}4364\pi_{t-2} + 0{,}3296dum_t) \quad (1)$$

The dummy variable will continue to take the value of zero for the credit risk estimates. This implies that relationship (1) can be simply rewritten in the form of (2) for the purposes of estimating the quarterly default rate.

$$df_t = \phi(-2{,}0731 - 4{,}9947hdp_t + 2{,}7839R_{t-4} - 2{,}4364\pi_{t-2}) \quad (2)$$

The coefficients from equations (1) and (2) cannot be simply interpreted as the commonly used elasticities of the impacts of the relevant macroeconomic factors on credit risk, as they are further recalculated using the cumulative distribution function of a normal distribution, hence their impact is not linear. A simple sensitivity analysis of the impacts of changes in the macroeconomic variables is given in section 5 of this article.

Chart 2 – Estimated default rate model
(quarterly data)



Source: **CNB**

The ability to explain the quarterly default rate by means of the estimated model (1) is shown in Chart 2. The estimated model is a variant of the binary choice model[159], to which the standard approaches to measuring the statistical significance of an estimate cannot be applied. However, there are numerous less common indicators which can be applied and which suggest that the model has a good performance.[160]

157 The latent factor expressed the unobservable part of the macroeconomic risk in the model, which cannot be explained by macroeconomic indicators. See the Annex for a detailed explanation of this coefficient.

158 The symbol ϕ denotes the distribution function of the normal distribution. Although the coefficient ρ from Table 1 is not present in equation (1), it is necessary for the estimate of the model. See the technical annex to this article for a detailed discussion of its role in the estimate and interpretation.

159 Binary models generally consider situations with two possible realisations of a dependent variable (0,1). They consist in estimating the probability of one of the events occurring. A formal description of the model used is included in the technical annex to this article.

160 For example, pseudo-coefficients of determination: Estrella $R_E^2=0,97$, Cragg-Uhler $R_{CU1}^2=0,95$, $R_{CU2}^2=0,95$, Veall-Zimmermann $R_{VZ}^2=0,80$. See the Annex for definitions of the indicators.

5. USE OF THE MODEL IN STRESS TESTING

Using the estimated model, the impacts of macroeconomic shocks on the default rate of the banking portfolio can be tested at the level of the aggregate economy. The estimated model is based on quarterly time series, so the estimated default rate is also a quarterly figure, which needs to be annualised for the purposes of stress testing.[161]

In order to forecast the default rate, we have to set the inputs to the macroeconomic credit model, which will also be used as the stress testing parameters. They include non-lagged annual real growth, nominal annual interest rates lagged by four quarters and annual inflation lagged by two quarters relative to the forecast horizon. These values can be set either expertly or as a percentage deviation from the macroeconomic forecasts drawn up by the CNB or as outputs from the CNB's macroeconomic model under an assumption of significant, improbable, but not entirely impossible, negative macroeconomic shocks.

The following Table 2 gives the results of the macroeconomic credit model for different combinations of values for GDP growth, nominal interest rates and the inflation rate. These are merely illustrative examples of the sensitivity of the credit risk indicator for different combinations of the explanatory variables, and are not the actual values entering the stress testing. Table 2 shows that the sensitivity of credit risk for example to a change in GDP growth of 1 percentage point differs *ceteris paribus* depending on the rate of such growth. For higher GDP growth rates, the impacts of a decline in growth of 1 percentage point are lower than for lower growth rates. The underlying reason is that the chosen variant of the model or estimation of the model (6) uses a calculation based on the cumulative distribution function of a normal distribution. A similar conclusion applies to the other variables in the model.

Tab. 2 – Sensitivity analysis of the model (quarterly change in bad loans in response to the value of exogenous variables)[162]

		GDP growth					
CPI	R	-2%	-1%	0%	1%	2%	3%
	2%	2.6%	2.3%	2.1%	1.8%	1.6%	1.4%
	4%	3.0%	2.6%	2.4%	2.1%	1.8%	1.6%
1%	6%	3.4%	3.0%	2.7%	2.4%	2.1%	1.9%
	8%	3.8%	3.4%	3.0%	2.7%	2.4%	2.1%
	10%	4.3%	3.8%	3.4%	3.1%	2.7%	2.4%
	4%	2.8%	2.5%	2.2%	2.0%	1.7%	1.5%
2%	6%	3.2%	2.8%	2.5%	2.2%	2.0%	1.8%
	8%	3.6%	3.2%	2.9%	2.6%	2.3%	2.0%
	10%	4.1%	3.6%	3.3%	2.9%	2.6%	2.3%
	4%	2.6%	2.4%	2.1%	1.9%	1.6%	1.4%
3%	6%	3.0%	2.7%	2.4%	2.1%	1.9%	1.7%
	8%	3.4%	3.0%	2.7%	2.4%	2.2%	1.9%
	10%	3.9%	3.5%	3.1%	2.8%	2.5%	2.2%
	6%	2.8%	2.5%	2.3%	2.0%	1.8%	1.6%
4%	8%	3.2%	2.9%	2.6%	2.3%	2.0%	1.8%
	10%	3.7%	3.3%	2.9%	2.6%	2.3%	2.1%
	6%	2.7%	2.4%	2.1%	1.9%	1.7%	1.5%
5%	8%	3.1%	2.7%	2.4%	2.2%	1.9%	1.7%
	10%	3.5%	3.1%	2.8%	2.5%	2.2%	1.9%

The results of the macroeconomic credit model are used in the current version of stress testing for estimating the proportion of bad loans in the portfolio, which is then entered in the stress testing as an input parameter. The credit model allows us to generate bad loans in the banking portfolio as a result of a shock in the form of a change in real GDP growth, nominal interest rates or inflation.

161 For the annualisation methods, see the preceding article *Summary of Results of Stress Tests in Banks* in this Financial Stability Report.

162 The sensitivity analysis uses non-lagged GDP growth, CPI inflation lagged by 2 quarters and nominal interest rates lagged by 4 quarters.

6. CONCLUSIONS

In order to develop a macroeconomic credit risk model for the Czech economy, we used a one-factor Merton-type model estimated for the aggregate economy. The model confirmed a very strong link between bank portfolio quality and the macroeconomic environment. The estimated macroeconomic credit risk model was incorporated into the existing version of stress testing, thus allowing us to find a link between credit portfolio quality and the macroeconomic environment. One of the possible improvements to the model would be to make it dynamic, which would make it possible to take into account the correlation of assets over time. The chosen type of model also allows it to be extended by including microeconomic data in the model or estimating the model based on sectoral data. The issue of estimating the probability of default in the aggregate credit portfolio is closely associated with a variable referred to as "loss given default". The current incorporation of the macroeconomic credit model into stress testing assumes the worst case scenario, i.e. a 100% loss. The modelling of the impact of macroeconomic shocks on the volume of bad loans in the portfolio could be made more precise in the future by estimating a model of loss given default as a function of the probability of default based on aggregate data.

ANNEX

The Macroeconomic Model Used – One-Factor Merton-type Model

The following equations describe the version of the latent factor model used, which appears in numerous papers.[163] The fundamental idea is based on the Merton model.[164] A random process with a standard normal distribution is assumed for the standardised logarithmic return on assets of a firm. The discrete normal logarithmic return satisfies the following equation for each firm in the economy.

$$R_{it} = \sqrt{\rho} F_t + \sqrt{1-\rho} U_{it} \tag{3}$$

R denotes the logarithmic return on assets for each firm *i* at time *t*. *F* corresponds to the logarithmic return in the economy independent of firm *i* at time *t*, which is assumed to be a random variable with a standard normal distribution. This variable represents the part of the return which is not specific to the firm and can thus satisfy the general conditions for profitability of firms in the economy. *U* denotes the return specific to the firm, which is again assumed to be random with a standard normal distribution. The two random variables are also assumed to be serially independent. The coefficient ρ expresses the correlation between the returns on assets of any two debtors. Given these assumptions, the logarithmic return on assets of each firm also has a standard normal distribution. The model is based on the Merton approach, according to which a default event occurs if the return on a firm's assets falls below a certain threshold. The applied variant of the model also assumes that the value of this threshold changes depending on changes in the macroeconomic environment. The value is modelled as a linear combination of macroeconomic variables. Based on all these assumptions, the probability of default of the firm can be derived, with ϕ denoting the distribution function of the normal distribution and x_{jt} denoting the macroeconomic indicators included in the model (gross domestic product, nominal interest rate, inflation and dummy variable).

$$p_{it} = P(R_{it} < T) = P(\sqrt{\rho} F_t + \sqrt{1-\rho} U_{it} < \beta_0 + \sum_{j=1}^{K} \beta_j x_{jt}) = \phi(\beta_0 + \sum_{j=1}^{K} \beta_j x_{jt}) \tag{4}$$

This enables us to derive the relationship for the conditional probability of default in response to the realisation of an unobservable factor (f_t denotes realisation of the unobservable factor F_t).[165]

$$p_i(f_t) = \phi\left(\frac{\beta_0 + \sum_{j=1}^{K} \beta_j x_{jt} - \sqrt{\rho} f_t}{\sqrt{1-\rho}}\right) \tag{5}$$

The same formal notation can be reached if we consider the effect of macroeconomic indicators within a factor which corresponds to the return independent of the firm, that is, a factor common to the entire portfolio of firms under consideration.

163 The latent factor model is found, for example, in Jakubík (2006), Rösch (2005), Céspedes and Martín (2002), Cipollini and Missaglia (2005) and Lucas and Klaassen (2003).

164 The model was formulated for the first time in Merton (1974).

165 The unobservable factor, or latent factor, is a random variable representing the return on assets of firms which is common to firms in the whole economic sector studied, in our case the whole aggregate economy. The realisation of this random variable cannot be observed, but one can make an assumption regarding its distribution. A normal distribution of this variable is considered here, although other forms of distribution, such as a logistic distribution, could also be used.

If we furthermore assume a homogenous portfolio of firms in the economy whose returns on assets correspond to process (3), the average default rate in the economy is then – based on the law of large numbers – equivalent to the probability of default of a firm. Given the assumption of homogeneity of firms in the economy, it is more appropriate to estimate the model on the basis of sectoral data. However, as the necessary data were not available, the model was only estimated on aggregate data for the whole economy. Therefore, some of the factors which might play a significant role in a particular sector may not be significant in the model estimated for the whole economy.

In order to estimate the model (4), a relationship with a conditional number of defaults of firms depending on the realisation of the random variable F representing the latent factor was used. The conditional number of defaults depending on the realisation of the random factor is a random variable which, under the given assumptions, has a binomial distribution, with the parameters of conditional probability $p(f_t)$ given by equation (5) and the number of firms N_t.

$$D(f_t) \approx Bi(N_t, p(f_t)) \tag{6}$$

The total number of firms and the number of firms in default in the economy were not available for individual periods. Aggregate data on growth in banks' bad loans were employed in the estimation of the model for individual quarters. To this end, the following line of reasoning was followed. Each koruna of a loan was considered an individual loan of a single client. In such case, therefore, the random variable *D* corresponds to the number of new bad koruna loans, or the growth in the volume of bad loans, while *N* stands for the total volume of loans granted. A default event is represented here by non-repayment of a loan of CZK 1. Under these assumptions, the volume of bad loans can be modelled by means of the relation (6).[166] The model was estimated by maximising a likelihood function containing a random latent factor, which was assumed to have a standard normal distribution.

A number of characteristics measuring the quality of the estimate can be applied to the above described model. One of the tests of model quality is a test of the hypothesis that all the coefficients β_j except the constant member are zero (H_0: $\beta_1 = \beta_2 = \ldots = \beta_K = 0$). This hypothesis can be tested by means of the likelihood ratio $\lambda = L_C / L_U$. The known result says that $-2\ln\lambda$ is an asymptotic chi-distributed variable with K degrees of freedom.[167] The results of the test rejected the hypothesis at a significance level of less than 1%.

The observed criteria of the pseudo-coefficients of determination based on the likelihood function also bear out the good quality of the model. These coefficients should be in the interval [0;1], with results close to 1 attesting to very good model quality.

$$R_E^{\,2} = 1 - \left(\frac{\ln L_U}{\ln L_C} \right)^{-\frac{2}{n}\ln L_C} = 0{,}97$$ Estrella (1998)

$$R_{CU1}^{\,2} = 1 - \left(\frac{L_C}{L_U} \right)^{\frac{2}{n}} = 0{,}95$$ Cragg-Uhler (1970)

$$R_{CU2}^{\,2} = \frac{1 - \left(\frac{L_C}{L_U} \right)^{\frac{2}{n}}}{1 - L_C^{\,\frac{2}{n}}} = 0{,}95$$ Cragg-Uhler (1970)

$$R_{VZ} = \frac{2(\ln L_U - \ln L_C)}{2(\ln L_U - \ln L_C) + n} \frac{2\ln L_C - n}{2\ln L_C} = 0{,}80$$ Veall-Zimmermann (1992)

166 The assumption regarding koruna loans is somewhat simplified, as koruna loans are not in fact independent.

167 The known result of the distribution – $2\ln\lambda$ is given, for example, in Rao (1973).

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THE IMPACT OF INSOLVENCY LAW ON FINANCIAL STABILITY[168]

This article takes as its central theme the development of insolvency law in relation to financial stability. While insolvency law does not constitute direct regulation of the financial market, it significantly affects the market and the way its participants behave. Quality insolvency law facilitates rapid exit of problem entities from the economic system and reduces the impacts of the losses incurred by insolvents on other businesses, households and financial institutions. Insolvency law therefore has an important role in terms of credit and systemic risk and directly affects the conditions for financial stability in the Czech economy. Moreover, it is a highly topical issue, because after many years of preparation the legislative process of adopting the new insolvency act[169] is nearing an end.

The following article presents the first comprehensive paper on the impact of legislation on financial stability, rendered through this Financial Stability Report. The introduction therefore briefly discusses the general relationship between the law and financial stability. Attention is then fixed on the central theme of the article – insolvency law.

1. GENERAL NOTES ON THE RELATIONSHIP BETWEEN THE LAW AND FINANCIAL STABILITY

The system of law regulates practically all relationships in society to a greater or lesser extent. Ideally, the law should eliminate instability in the broadest sense of the word, including financial system instability. Indeed, the law itself can be a source of such instability. In a normally functioning market economy and a state that respects the rule of law, however, a specific legal rule can only rarely be identified as a direct cause of financial instability. Rather, the system of law creates conditions that limit such risk. In the worse case, the law does not respond to such risk or may even increase it. The legal environment therefore is a necessary supporting element of financial stability.

The issue of the legal environment as a source of potential financial sector instability can therefore be paraphrased as an issue of deficiencies in the law that can counteract systemic stability and boost systemic risk ("contagion risk"). Deficiencies in the law include, in addition to the absence of certain rules, an excessive number of rules and poor transparency,[170] or rules that merely exist "on paper" without due implementation or supervision of compliance in practice. Relative stability, continuity and predictability of the law also contributes to the health of the economy. Excessively frequent changes of direction act negatively in this respect.[171]

As regards their impact on the financial system stability, legal rules can be divided into several categories, although the borderlines between them are to some extent artificial and blurred:

1. The first category consists of laws that significantly influence the stability of the financial sector even though financial stability or regulation of conduct on the financial market are not themselves the key objectives of such legal rules. Examples include the Commercial Code, the Act on Bankruptcy and Composition and the Act on the Protection of Economic Competition.

2. The next category comprises "macroeconomic" laws, dealing primarily with economic growth, employment, exchange rate stability, fiscal issues and so on. Examples include laws regulating taxation and public budgets in general, the exchange rate and foreign exchange, investment incentives and international investment protection treaties. Such statutes have a fundamental effect on the economic and financial stability of the state as a whole. Simplifying, however, we can say that they have roughly the same significance for banks and other financial institutions as they do for other businesses and the public.

3. The third category consists of regulations responding to extraordinary events linked with instability of the financial system. These can include both events of non-financial nature (armed conflicts, terrorist attacks, epidemics or natural disasters) and sudden and deep crises triggered by financial and economic factors.[172] These regulations try to remedy instability that has already occurred and do not usually influence the causes of, or prevent, financial instability.

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168 Tomáš Rýdl, CNB.

169 Act No. 182/2006 Coll., on Insolvency and Methods of Resolution Thereof (Insolvency Act). The Act will enter into force on 1 July 2007.

170 For example, one of the key factors a potential investor considers when making a decision on a cross-border investment is the transparency of the legal and administrative infrastructure of the target country.

171 The issue of "over-regulation" is discussed at the end of this article.

172 Typical examples of such "crisis legislation" include the provisions of the Foreign Exchange Act dealing with states of emergency in the foreign exchange economy, the Crisis Act and the State Aid Act.

4. The last category comprises laws and their implementing regulations that directly regulate the business of financial market participants, their conduct towards clients and the functioning and supervision of markets. Such rules should have the greatest preventive effect against systemic risk, by promoting regulation, supervision and market discipline of financial intermediaries themselves.[173]

This category of legal rules applies most closely to the activities of financial market participants and to the CNB as the financial market supervision authority.[174] Considerable progress has been made in this area compared to the situation in the 1990s, in particular thanks to the harmonisation of the national law with that of the European Communities (EC). As EC law deals heavily with financial market regulation, the Czech legal and regulatory conditions for financial market business are highly compatible with those in other EU member states and states of the European Economic Area. Harmonisation of regulations is significantly reducing systemic risk in the Europe-wide context.

With regard to systemic stability, few major changes were made to the national financial market legislation in 2005. Among the new regulations in this context, the Act on Financial Conglomerates deserves special attention.[175] Compared to the original plan (i.e. to transpose the Directive on the supplementary supervision of credit institutions, insurance undertakings and investment firms in a financial conglomerate)[176] the act was considerably expanded to cover additional areas. It should be noted from the systemic stability perspective that, in addition to supplementary supervision itself, the act introduced supervision of insurance companies in a group, aligned the regulations on credit unions with the rules contained in the Act on Banks and corrected certain deficiencies in the hastily adopted amendment to the Commercial Code, introducing the principle of squeeze-out of minority shareholders.[177] The act also introduced important changes from the financial market perspective into the Act on Bankruptcy and Composition.[178]

The central focus of this article is insolvency/bankruptcy law, which belongs to the first category of rules, whose development and recent changes may affect the functioning and stability of financial markets.

CZECH INSOLVENCY LAW FROM THE POINT OF VIEW OF FINANCIAL SYSTEM STABILITY

Since the second half of the 1990s, when, in response to the incipient weakening of the Czech economy, the principle of bankruptcy began to be widely used,[179] it has been pointed out that the Act on Bankruptcy and Composition, despite having been amended more than 20 times,[180] is obsolete. Critics have pointed out that the act is based on the law and business ethics of the Czechoslovak "First Republic" (before WWII) and that it is more suitable for the bankruptcy of a small enterprise with no more than a few dozen creditors located close to the debtor's registered office (place of residence) than for large companies. Another objection has been that the act is too rigid and does not in fact provide any alternative to bankruptcy as a liquidation method of dealing with insolvency (the legal requirements for composition, as mentioned below, virtually prevent composition from being applied more frequently). The act does not provide for sensitive differentiation between different types of insolvents (such as consumers, small businesses, industrial giants or financial institutions) and fails to provide creditors with sufficient legal mechanisms to take decisions on dealing with insolvency in a way that corresponds to their economically legitimate claims on the insolvent's assets. For many years the act has also been the target of serious criticism from financial market participants and regulators.

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173 Examples include the Act on Banks, the Act on Capital Market Undertakings, the Insurance Act and the Collective Investment Act.

174 On 1 April 2006, the CNB assumed supervision of the entire Czech financial market under Act No. 57/2006 Coll.

175 Act No. 377/2005 Coll., on the Supplementary Supervision of Banks, Credit Unions, Electronic Money Institutions, Insurance Undertakings and Investment Firms in Financial Conglomerates and on the Amendment of Some Other Laws (Financial Conglomerates Act).

176 This issue is regulated by Directive 2002/87/EC of the European Parliament and of the Council of 16 December 2002 on the supplementary supervision of credit institutions, insurance undertakings and investment firms in a financial conglomerate.

177 Act No. 216/2005 Coll. *Squeeze-out* (formally "the right of purchase of participation securities") is a problematic principle of corporate law (and the law in general with respect to the key aspect of protection of ownership). From the point of view of the stability and development of the financial system, it is useful to note its two conflicting impacts. On the one hand, it can help to clarify and simplify ownership structures, corporate governance and the control systems of many financial groups, which is beneficial both to the group itself and to the supervisory authorities. On the other hand, squeeze-out of minority shareholders reduces the diversity of publicly traded shares and hence also the long-term investment opportunities for households.

178 More detailed descriptions of the Financial Conglomerates Act and other new financial market legislation are given in other CNB publications, e.g. Banking Supervision 2005 or Czech Capital Market Situation Report 2005.

179 More details on the number of bankruptcy petitions filed are given in section 3.1. *Non-Financial Corporations*.

180 Bankruptcy and composition are regulated by Act No. 328/1991 Coll., on Bankruptcy and Composition, as amended.

From the point of view of the financial market and financial stability, insolvency law plays an important role in influencing credit and systemic risk. Insolvency law co-determines how the insolvency of a debtor of a bank or other financial institution impacts on its stability or how the insolvency of a single bank or financial institution affects the whole system (contagion risk). This article focuses specifically on those aspects of insolvency law which are material in terms of the risks set out above. Many of these aspects have caused problems in the past and have now been successfully remedied, but some of them persist and pose a future legislative challenge.

3. SELECTED ELEMENTS OF SYSTEMIC RISK IN INSOLVENCY LAW

● ***The zero-hour rule***

A declaration of bankruptcy is associated with numerous legal effects. It results in the debtor losing the right to dispose of its assets. Upon declaration of bankruptcy, some legal acts by the debtor are deemed invalid, ineffective or challengeable. Under the previous rules, the effects of a declaration of bankruptcy commenced on the date of posting of the bankruptcy declaration decision on the official noticeboard of the court, i.e. retroactively, starting from the very first moments of the day in question, even though the decision may have been posted at, say, 2 p.m. (known as the *zero-hour rule*). The rule caused legal uncertainty to the contractual partners of the debtor and posed a fundamental problem particularly in cases of insolvency of a participant in a payment system or settlement system of an investment instrument market, as a transaction concluded on the bankruptcy declaration date but prior to the posting of the decision could be voided retroactively, with the other party to the transaction having no objective way of knowing about such declaration of bankruptcy.

On 1 April 1998, the zero-hour rule was rescinded, so that the effects of bankruptcy commence only at the moment of posting of the decision on the court's official noticeboard. In addition, the court has, since 1 January 2003 and 1 May 2004 respectively, been obliged to notify the CNB of any declaration of bankruptcy on a participant in a payment and settlement system recorded in a list kept by the CNB under special legislation.[181] The CNB then has to immediately forward such information to the system operator and to the entities performing the functions of central counterparty, settlement agent and clearing house in the system (the CNB itself is the operator of the sole payment system in the Czech Republic).

Under the new legislation, the need for easier and more accessible notification of all creditors and any other entities of the insolvency of a particular person should be provided for by a remotely accessible insolvency register and electronic posting of decisions on insolvents.

● ***Finality of transfer orders entered into a payment or settlement system***

The above issues of informing creditors about bankruptcy declarations and the effects of such decisions are connected with a requirement on the part of the financial markets and their regulators that payment and settlement systems should prevent the occurrence of secondary insolvency should any system participant become unable to pay its obligations. The systems should achieve this by ensuring finality and enforceability (i.e. execution) of transfer orders entered by such participant into the system up to the moment the system operator becomes aware that the participant has been declared bankrupt or become subject to a similar measure relating to suspension of payments. In the case of payment systems, the above requirements have been met by the Payment System Act and a simultaneously adopted amendment to the Act on Bankruptcy and Composition since 1 January 2003. In the case of settlement systems, the requirements have been met by the Act on Capital Market Undertakings and the Act on Bankruptcy and Composition since 1 May 2004.

● ***Close-out netting***

Close-out netting is a legal framework for final netting of mutual claims and obligations from derivatives transactions, loans of securities, repos or other financial transactions between institutional investors or between institutional investors and their clients where one of the parties becomes insolvent.[182] The point is to have a close-out netting agreement that is enforceable even in the event of bankruptcy proceedings which are otherwise governed by the principle of "preservation" of the balance of claims and obligations as at the moment of declaration of bankruptcy.

181 Act No. 124/2002 Coll., on Transfers of Funds, Electronic Payment Instruments and Payment Systems (the Payment System Act), as amended, and Act No. 256/2004 Coll., on Capital Market Undertakings. Until 31 March 2006, the Czech Securities Commission maintained the list of settlement systems.

182 Close-out netting usually takes place in the event of the more widely defined default by a contracting party than in the event of insolvency only.

The main argument for enacting recognition of close-out netting in bankruptcy is its contribution to eliminating the risk of contagion in the financial sector from one insolvent to its contractual partners. Their mutual transactions run to millions or billions of Czech korunas, but overall represent a single net obligation of a considerably lower amount. In addition, recognition of close-out netting reduces the capital requirements for the transactions concerned for the purposes of compliance with the capital adequacy rules. Institutions from "netting jurisdictions" are therefore, from this perspective, more attractive contractual partners in the financial market, giving them a competitive advantage over those whose bankruptcy law does not recognise close-out netting.

The main counter-argument used by the opponents of close-out netting is the inequality that would thereby arise between the creditors and debtors of the insolvent. This is often accompanied by the comment that it puts financially strong entities at an advantage over financially weaker entities. The effort to legalise close-out netting has been criticised even more given the existence of the still valid, but problematic absolute ban on the set-off of claims in bankruptcy proceedings.[183]

The first attempt to enact close-out netting rules in the Czech Republic was made at the end of 2000, when the first definition of close-out netting of profits and losses appeared in the Securities Act.[184] This merely provided for the signing of a contractual arrangement (the actual mechanism of such transactions). The Act on Bankruptcy and Composition was not amended in this respect, so the option of close-out netting remained absent from Czech bankruptcy law.

An improvement came on 1 May 2004 with the coming into effect of the new Act on Capital Market Undertakings and a related amendment to the Act on Bankruptcy and Composition.[185] By that time, inviolability of close-out netting in the case of bankruptcy and composition proceedings had been provided for to some extent. However, there was still a problem with the specific definition of close-out netting in the Act on Capital Market Undertakings, as the definition had been assumed from the aforementioned Securities Act. The definition was based on an accounting approach and talked about the setting-off of profits and losses on individual transactions covered by close-out netting. Primarily for the purposes of the Bankruptcy Act, however, it was necessary and more precise for the definition to be based on civil law terminology and to deal with concurrent mutual claims or obligations arising from such transactions.

Comprehensive legal treatment of the close-out netting issues came only with the adoption of the Financial Conglomerates Act on 29 September 2005. The act, among other things, transposed the directive on financial collateral arrangements[186] into the Czech legislation. The directive regulates close-out netting and its definition, recognition and enforceability in quite some detail. A new, more flexible yet more precise national legal definition of *close-out netting* has been introduced (now without the "profit and loss" tag). The earlier discussion as to which "eligible" parties should be allowed to enter into such contractual arrangements has been resolved by an approach under which the law does not expressly restrict or define the entities eligible to enjoy the benefits of close-out netting, although it does generally define the types of transactions that may (solely) be covered by close-out netting provisions. Recognition of close-out netting has also been enacted, along with bankruptcy and composition, for instances of forced administration imposed on one of the parties to such an arrangement.

- ***Financial collateral***

For essentially the same reason as in the case of close-out netting, i.e. to prevent the systemic risk of contagion through the financial market, market participants (including central banks) and regulators have been making efforts to introduce inviolability of realisation of financial collateral arrangements in the event of the insolvency of one of the parties to such an arrangement.[187] The arguments used by the opponents of such initiatives are again based on the violation of the principle of equality of creditors during bankruptcy proceedings and the favouring of financial institutions.

183 The new Insolvency Act should largely overturn this ban.

184 Act No. 591/1992 Coll., on Securities, as amended by Act No. 362/2000 Coll.

185 For details, see Act No. 257/2004 Coll., Amending Some Laws Relating to the Adoption of the Act on Capital Market Undertakings, the Act on Collective Investment and the Act on Bonds.

186 Directive 2002/47/EC of the European Parliament and of the Council of 6 June 2002 on financial collateral arrangements.

187 The risks in payment systems are discussed in section 5 *The Financial Infrastructure*. Interbank contagion risk is discussed in the article *Summary of the Results of Stress Tests in Banks*.

The legislation providing for inviolability of financial collateral was implemented on two levels. First, it was harmonised with the directive on settlement finality[188] through the Payment System Act (as of 1 January 2003) and the Act on Capital Market Undertakings (as of 1 May 2004) and related amendments to the Act on Bankruptcy and Composition. In addition to the above finality and enforceability of transfer orders entered into a payment or settlement system on the date of declaration of bankruptcy on a participant therein, systemic risk was eliminated by enactment of the entitlement of other system participants to exercise their right to collateral provided to them by the insolvent participant and used to secure its obligations arising from its participation in the system. For these purposes, collateral was defined very broadly, if not vaguely, as the rights to an asset used to secure the relevant obligation. Inviolability and realisation of collateral provided by an insolvent participant to the CNB, the ECB or the central bank of another member state was enacted at the same time.[189]

The second phase, which impacted on a much wider range of transactions in the financial market, was introduced by the Act on Financial Conglomerates. This act, in line with the directive on financial collateral arrangements, incorporated the issue of financial collateral into the Commercial Code.[190] Under the Commercial Code, "financial collateral" means collateral provided for claims arising from transactions, the subject of which is solely cash or financial instruments, and which has been arranged between the collateral provider and the collateral taker as:

a) a security interest on a financial instrument,
b) a security interest on a deposit claim,
c) a title transfer of a financial instrument, or
d) a title transfer of cash.

In the event of the insolvency of a collateral provider, the collateral taker is entitled to satisfaction of its secured claim from the collateral provided[191] or close-out netting occurs between them. No special formal administrative or judicial steps are required to exercise this right. The new legislation overturns the ban on so-called forfeiture of pledge, as it allows the claim of a collateral taker to be satisfied by appropriation of the pledged financial instrument, provided that such option has been arranged and the arrangement also includes the method of valuation of the relevant financial instrument.

By contrast with close-out netting, however, a financial collateral arrangement may be agreed solely between selected entities. One party to the contract must be a professional domestic, foreign or international financial institution, a state or a self-governing unit, and the other party must also be an entity of the same kind or a large enterprise.[192] This is meant to prevent the misuse of financial collateral arrangements to evade the effects of bankruptcy or composition proceedings in "retail" relationships. Likewise, it serves to avoid situations where a bank or another financial institution uses a financial collateral arrangement solely to manage the credit risk of non-institutional clients, to the detriment of other potential bankruptcy creditors. Financial collateral should therefore primarily fulfil its role of protection against systemic risk.

Under the Act on Bankruptcy and Composition, a creditor that is a taker of collateral provided by an insolvent does not have the status of a separate (secured) creditor, or of a bankruptcy creditor at all, and receives satisfaction from financial collateral entirely outside bankruptcy proceedings. In addition, the bankruptcy rules relating to the invalidity and challengeability of some legal acts performed within a statutory period prior to the declaration of bankruptcy do not apply to provision and realisation of financial collateral. Inviolability of financial collateral arrangements is similarly regulated in cases of composition or forced administration of the collateral provider, and, on the other side, in cases of payment difficulties of the collateral taker.

188 Directive 98/26/EC of the European Parliament and of the Council of 19 May 1998 on settlement finality in payment and securities settlement systems.

189 Neither the act nor the directive define the reason based on which such inviolable collateral may be provided to the central bank.

190 Specifically, Article 323a et seq. of Act No. 513/1991 Coll., the Commercial Code, as amended by Act No. 377/2005 Coll.

191 Financial collateral is cash or financial instruments (i.e. investment instruments and claims and rights relating thereto) provided by a collateral provider as the subject of a financial collateral arrangement. Hence, a financial collateral arrangement is a type of collateral arrangement based on either a security interest or a security transfer of a right (usually a title transfer), while the financial collateral is the asset functioning as security.

192 The law talks about legal entities that meet at least two of the following three criteria: total assets of at least CZK 600 million, net annual turnover of at least CZK 1.2 billion and equity capital of at least CZK 60 million.

● ***Bank insolvency***

In the mid-1990s, when minor banking institutions began to go bankrupt, in addition to procedures and rules to prevent bank insolvency (banking regulation and supervision), the issue of special legislation covering the exit of banks from the sector began to be discussed. Numerous reasons were identified for which the application of general legislation to resolve bank insolvency appeared inappropriate. However, no comprehensive legal solution was ever adopted or proposed. Given the completed consolidation and stabilisation of the banking sector, this fact no longer poses any serious systemic risk. However, in the event of a major bank or group of banks running into problems that threaten its existence, the legislation in force offers no special solutions (except, perhaps, for forced administration).[193] From the point of view of system stability, the deposit insurance legislation, of course, mitigates the risk of runs on banks in distress and lessens the impacts of potential bank insolvency on depositors, most notably households.

However, a series of provisions has been adopted over the years which reflect the specific features of banks or former banks in bankruptcy. In 2000, the principle of subordinated debt, or claims bound by a condition of subordination which are satisfied in bankruptcy proceedings only after satisfaction of all other claims except for other subordinated debts (and, of course, shareholders), was incorporated into the Bankruptcy Act and the Act on Bonds. This established the legal justification for a principle previously applied only in the capital adequacy regulations and thus clarified all the doubts as to whether or not banks in the Czech Republic should be allowed to use subordinated debt as a cheaper source of capital.

The most special rules for resolving bank insolvency were introduced into the Act on Bankruptcy and Composition by the Act on Financial Conglomerates of 2005.

a) First, the act introduced a ban on the application of the Act on Bankruptcy and Composition to any bank with a valid banking licence. Among other things this helped to prevent the previously occurring "artificial" petitions for the declaration of bankruptcy, which can cause losses even to a healthy bank if its clients respond with alarm to news of the opening of bankruptcy proceedings.
b) In line with the acquis communautaire,[195] however, the amendment mainly consisted of rules addressing cross-border insolvency of banks, i.e. of banks having a branch in one or more states of the European Economic Area. From the current perspective of Czech banks, the regulation is not of key importance (even if one of them was to collapse), as Czech banks as a rule have no foreign branches. From the perspective of branches of foreign banks operating on the Czech market under the single European licence and their clients, however, the act should be given attention. In the Europe-wide context, it is a comparatively significant systemic solution, long in preparation, which enacts the principle of universality of bankruptcy or reorganisation proceedings at the expense of the territoriality principle previously applied in many countries. This means that bank insolvency is addressed in a single process conducted by the home country authorities of the credit institution without the option of conducting separate insolvency proceedings in host countries vis-à-vis its branches located there.
c) Beyond the framework of harmonisation, this amendment introduced one more change into the bankruptcy legislation – a different method for determining the claims of bankruptcy creditors in the case of an insolvent bank. Given the huge numbers of often poorly eligible bank creditors with minor claims (most notably depositors after payment of 90% of their claims from the Deposit Insurance Fund), a rule was introduced that the claims of the bank's creditors are based on their amounts in the accounting documents of the bank – and the claims are deemed lodged in such amounts. If the creditor disagrees with this amount, which the bankruptcy trustee must notify him of, the creditor may file objections, which, should the disagreement with the trustee persist, are decided by the court. This should substantially simplify the determination of claims.[195]
d) Similar rules for cross-border insolvency proceedings and determination of claims, as well as the inapplicability of the Bankruptcy Act to institutions with a valid business licence, also apply, in compliance with EC laws, to the insolvency of a credit union or an insurance company.[196] In the case of insurance companies we should mention that satisfaction of insurance claims prevails over any other claim on the insolvent except for the cash expenses and fee of the trustee and costs related to the maintenance and administration of the estate.

193 Also, the provision of any financial assistance by the state or the CNB in seeking a solution to the problem bank's situation would be complicated by the relative prohibition of state aid under EC competition law.

194 Directive 2001/24/EC of the European Parliament and of the Council of 4 April 2001 on the reorganisation and winding up of credit institutions.

195 Moreover, the bank's creditors can no longer contest each others' claims. Only the trustee may dispute their existence, nature and amount with the creditor.

196 EU law is in this respect represented by Directive 2001/17/EC of the European Parliament and of the Council. of 19 March 2001 on the reorganisation and winding-up of insurance undertakings.

197 Until 1 May 2004, a mortgage loan was defined as a loan provided for investment in residential real estate and secured by this type of real estate. Currently, it is defined as any loan secured by any real estate. This expands the amount of such assets, but may somewhat diminish their quality.

e) Also fairly important for both banks and their creditors is the provision of the amended Act on Bankruptcy and Composition regulating so-called mortgage estate and satisfaction of claims from mortgage bonds in the event of issuer insolvency. The assets backing mortgage bonds, i.e. primarily mortgage loan claims, constitute mortgage estate, and the proceeds of its realisation are used *pro rata* to satisfy the claims of mortgage bond holders. If any part of the proceeds remains after satisfaction of these claims it is used to satisfy the other claims. In the opposite case, the part of the mortgage bond claims which has not been satisfied is included among the other bankruptcy claims. The implementation of this measure means that mortgage bonds have acquired in full the features of asset-backed securities and hence also an improved credibility. Previously, the claims of their holders had priority only over ordinary unsecured creditors, and the assets covering these bonds were deemed an inseparable part of the bankruptcy estate.[197]

● ***Separation of assets in case of insolvency of an investment firm***
Unlike deposits in banks or credit unions, investor assets (investment instruments and cash entrusted to an investment firm to perform an investment service for a client or such assets procured for a client) do not become the property of the investment firm during the provision of investment services. Therefore, they are not included in the bankruptcy estate in the event of its insolvency. During the first insolvency cases in the field of investment firms, however, this interpretation was not unanimously supported in particular by bankruptcy trustees. Since 2002, therefore, the act has stated[198] the bankrupcy trustee must release client assets to clients without undue delay. If there are insufficient client assets available to comply with this duty, the trustee himself must lodge, on behalf of the client, the unsatisfied part of such claim in the bankruptcy proceedings as an "ordinary" bankruptcy claim.

4. SOME ELEMENTS OF CREDIT RISK IN INSOLVENCY LAW[199]

● ***Debtor's duty to initiate insolvency proceedings***
Successful resolution of insolvency, or minimisation of the losses for creditors, is based on timely initiation of insolvency proceedings and prevention of deterioration of the value of the insolvent's assets. Such a move should naturally come from the debtor, as nobody else has a better knowledge of insolvent's financial and economic condition. Especially in the 1990s, however, debtors deferred bankruptcy for so long that there were later often insufficient assets to cover the costs of the bankruptcy proceedings.

On 1 April 1998, the duty of an entrepreneur to file a bankruptcy or composition petition immediately after becoming insolvent was included in the Act on Bankruptcy and Composition. This duty was linked to personal liability for any loss caused to the creditors by any delays. Two years later, the criminal offence of excessive debt was included in the Criminal Code, with sanctions not only for both bringing excessive debt upon oneself, also for anyone who deliberately or due to deliberate negligence accepts a new obligation or establishes a security interest despite knowing that he is excessively in debt.[200] At the same time, barriers were enacted in commercial law to carrying on business or holding a position in a statutory body of a company by persons who, putting it simply, have previously contributed to the insolvency of another business.

These legal principles force debtors – both legal persons and entrepreneurs, or persons acting on their behalf – to comply with the duty to file petitions to initiate insolvency proceedings in a timely manner. This duty, however, does not apply to natural persons – consumers – so insolvency law does not directly prevent them from getting further into debt.[201]

● ***Immediate maturity of a debtor's claims***
In the event of declaration of bankruptcy, all claims of the insolvent become due and payable, which inherently carries the risk of secondary insolvency. This is particularly important with respect to long-term claims (e.g. immediate maturity of mortgage loan claims or long-term business contracts) and can also prove counterproductive in terms of the proceeds of bankruptcy proceedings. In addition, given the well developed market in sales of claims, such assets are often easy to sell on favourable terms. The new act (with effect from 1 July 2007) should rescind this rule.

198 First in the Securities Act and later in the Capital Market Undertakings Act. It basically involves an indirect amendment of the Bankruptcy and Composition Act.

199 Credit risk may, in the case of major insolvents or considerable frequency, trigger problems of a systemic nature. Credit risk is traditionally the most significant risk faced by Czech banks. An analysis of interbank contagion is given in the article *Summary of the Results of Stress Tests in Banks*.

200 Specifically Article 256c of Act No. 140/1961 Coll., the Criminal Code, as amended by Act No. 105/2000 Coll.

201 Various registers of information on client creditworthiness thus play a preventive role in such cases.

● ***Satisfaction of claims of separate creditors***
A problematic issue from the perspective of banks and any other providers of secured loans is a provision of the amended Bankruptcy Act of 2000 which, with the aim of increasing the satisfaction of unsecured creditors, has limited the rights of separate (secured) creditors whose claims on the insolvent are secured by asset-type collateral.[202] Currently, separate creditors may be satisfied only up to 70% of the proceeds of the sale of the collateral falling to them. The remainder of the claim can be then satisfied in the relevant class of unsecured creditors. Under a ruling of the Supreme Court, 70% of the realisation proceeds falling to a secured creditor means 70% of the amount generated by realisation of the asset securing the creditor's claim (net of the costs associated with the maintenance, administration and sale of the said asset) up to the amount of the secured claim. [203]

The above ruling allows for the credit risk associated with this provision of the act to be eliminated through "oversecuring" of the claim so that the net proceeds from the sale of the pledge cover the amount of the outstanding obligation of the debtor. On the other hand, this fact reduces the availability of loans to both households and companies. The new act should (as from 1 July 2007) rescind the "70% rule".

● ***Failed groups of businesses (concerns)***
One of the unresolved issues of insolvency law, and consequently also a risk to financial stability, is the issue of failures affecting business groups (concerns/consolidated groups). The law addresses insolvency of a business with a branch network in the EU,[204] but does not address insolvency of a group whose members operate in various countries. From the economic perspective, the two schemes are often quite close to each other, but from the legal perspective they are fundamentally different. Each entity in a concern is considered absolutely independent in terms of bankruptcy law. This has at least two negative implications.

Firstly, in the event of insolvency threatening any of the entities in a concern, a tendency to perform "bankruptcy arbitrage" may arise, i.e. to move assets and liabilities around within the group in order to create a situation where the entity domiciled in the country with the legal system offering the most favourable insolvency conditions is deliberately targeted to become the bankrupt. Secondly, if the whole concern or more than one of its members become insolvent, there are no binding rules for co-ordinating separate insolvency proceedings conducted against the group members concerned, or of co-ordinating the actions and interests of creditors of individual insolvents.

● ***Methods of resolving insolvency without liquidation***
Composition is an alternative method of resolving insolvency. Unlike bankruptcy, composition is aimed at discharging the insolvent's debts and ensuring continued operation of its business under an arrangement with its creditors.[205] This method, however, has failed in practice. One of the legal reasons is that the bankruptcy resolution method has to be proposed and determined essentially at the beginning of the proceedings. Also, the use of this principle is restricted to petition by the debtor. While such petition should be the priority option for composition petitions, in cases where the debtor does not make use of this option or submits an unacceptable proposal, the creditors should be given the opportunity to resolve the insolvency without liquidation. Another problematic provision of the act ties approval of composition to the condition that creditors who hold no priority claims should be offered payment of at least 30% of their claims (or even 45% until 30 April 2000) within two years of the filing of the petition.

A functional non-liquidation solution for a debtor's insolvency is vital with respect to both large enterprises and personal (consumer) insolvency. The latter is becoming ever more frequent. In both cases it is desirable for the debtor, provided that it acts honestly, to have the opportunity discharge its debts in insolvency proceedings and to have the right to a "new economic life". To that end, the new Insolvency Act (as of 1 July 2007) should apply the principles of reorganisation (for businesses) and debt discharge (for non-businesses).

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202 In particular a security interest, a lien, a title transfer or an assignment of a claim. It does not apply to financial collateral arrangements (see above).

203 See Ruling of the Supreme Court of the Czech Republic Rc 18/2003 Odo 519/2001. Until this ruling, a legal interpretation had quite often been applied according to which a separate creditor should never be entitled to satisfaction from collateral in excess of 70% of the value of his claim.

204 Council Regulation of 29 May 2000 on insolvency proceedings (1346/2000/EC). The issues are also covered by the preceding passages on insolvency of banks, credit unions and insurance companies.

205 Even in bankruptcy proceedings, it is possible to sell a business or a part thereof, including employees, to a new owner and so provide for its ongoing operation. Creditors, however, have to rely on the distribution of the outcome of the sale of the bankruptcy estate, which includes the price obtained in this sale.

5. CONCLUSIONS

In the context of the upcoming new insolvency legislation, this article set out to highlight some of the problems that the current Act on Bankruptcy and Composition has caused or is still causing. The new Insolvency Act should, *inter alia*, strengthen the positions of unsecured and secured creditors, improve the quality of bankruptcy trustees,[206] introduce alternative insolvency resolution methods (reorganisation and debt discharge) to replace the current composition process, and also allow insolvency that is only just threatening to be addressed. The provisions reducing systemic or credit risk which have been already successfully incorporated into the current bankruptcy law should be adopted – and, where necessary, further specified – in the new act.

As already noted in the introduction, the domestic financial market regulations are, given the strong influence of EC law in this area, a factor assisting stability of the financial system. Even the best regulations and strictest supervision, however, cannot forever prevent problems arising in the financial sector with a potential adverse impact on the client and business partners. Banking and financial market activity is a type of business (using others' money), but it is a business based on exposure to risk. Therefore, problems affecting individual entities cannot be entirely ruled out. On the other hand, the systemic stability of the financial sector should not be threatened by deficiencies in the legal and regulatory environment.

Somewhat paradoxically, however, there may be a risk of "over-regulation" of the financial sector (and not only of the financial sector). At a time of globalisation and free trade, there are no legal obstacles that would, in principle, prevent entities from doing business in a particular segment of the financial market or on an international scale. However, one has to be concerned about the quantity of rules governing business in the interests of systemic stability, fair competition, the soundness of individual institutions, market efficiency, customer protection etc. In addition to the extent and content of these rules, we also need to take into account the fact that they are undergoing frequent changes compared to the past and that the legal environment is thus losing its transparency and long-term stability. Although the regulations are consequently becoming more and more relaxed and sensitive to the entities they are targeted at, their number and sophistication and the frequency of the changes to them are increasing. It is therefore becoming increasingly challenging and costly for regulated entities to respond in time to the new regulations. A similar problem is also faced by the authorities responsible for supervising compliance with these rules, and also by the courts.

This situation is by no means confined to the transition economies, but is a problem faced by essentially the entire European Union, and in particular those states with a legal tradition of written law. The European Union is aware of this fact and its adverse impacts on the development of markets, small and medium-sized enterprises and the entire EU economy.[207] Finding the way out is more a matter of philosophical and political considerations than legal ones and would seem to be one of the key challenges going forward, at least on the European scale. The aim is to provide for the sound development of the financial system.

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206 The issue of the quality of bankruptcy trustees is addressed in a related, but separate, act on insolvency trustees. At the time of writing, the relevant bill had been returned, complete with proposed amendments, to the lower house of Parliament by the Senate. The estimated effective date of the act is 1 July 2007.

207 Such as the European Commission White Paper *Financial Services Policy 2005–2010*; section 2 (*Better Regulation*), especially sub-section 2.5 (*Simplification, Clarification, Codification*); Annex II, p. 10.

DETERIORATING COST EFFICIENCY IN A BANK SIGNALS THE RISK OF FAILURE[208]

The banking sector is a dominant component of the financial system in the Czech Republic. The stability of the banking system is of key importance as regards the financial stability of the economy as a whole. Any turbulence in the banking system can, moreover, generate a need for additional fiscal expenses in this area. For these reasons it is important to analyse banking sector developments in more detail and to attempt to enhance the early warning system toolkit – bank ratings, in order to prevent bank failures more effectively.[209]

The transition from a centrally planned economy to a market oriented system has been a complex and challenging process entailing a series of social and economic changes. The impacts of the economic transition in Central and Eastern Europe have affected the region's banking systems, which have been through turbulent times marked by frequent bank failures. The Czech banking market also experienced such turbulence, especially in the 1990s. During 1993–2003, a total of 21 banks closed down, which represents almost half of the banks then registered in the Czech banking system. As the bank failures were distributed gradually over time and new banks kept on entering the market, the stability of the overall banking sector remained largely unaffected. The total assets of the banking sector were little affected by the impact of the failing banks,[210] since the exits from the system mainly concerned the segment of small banks. Table 1 provides an overview of the developments in the banking sector.

Tab. 1 – Banking sector developments

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Entries*	–	1	3	–	2	–	–	–	–	–
Exits – official year of failure**	1	2	3	5	3	3	2	–	–	2
Mergers	–	–	–	–	2	–	1	1	1	–
Banks in system at start of year	48	47	46	46	41	38	35	32	31	30
Banks excluded (incomplete data)	5	1	3	4	2	1	–	1	–	2
Of which: due to entry/exit during year	–	–	1	4	2	–	–	–	–	2
No. of banks in analysis	42	45	43	37	36	34	32	30	30	28
Banking sector assets (109, 1994 prices)	1.27	1.38	1.45	1.44	1.15	1.36	1.22	1.35	1.46	1.57

Note: * GE Capital Bank's entry in 1998 was effected by its purchase of part of Agrobanka
** licence withdrawal, conservatorship or liquidation.

In the literature, bank management is assigned particular significance for the successful functioning of banks. In current practice, the assessment of a bank's management is a result of *ad hoc* processing of information available to the analyst and hence shows considerable subjectivity. Consequently, this element remains largely neglected in the current rating systems (CAMELS, ORAP, etc.).[211] This article sets out to describe a potentially usable concept of cost efficiency for more objective measurement of banks' management quality and demonstrates that this indicator is a good indicator of bank failure.

Bank cost efficiency measures the efficiency of banks relative to the most efficient bank determined on the basis of a model. This concept focuses on the management of operating costs (wages, physical capital and borrowed funds) of producing the same output (of loans and deposits). However, it also includes allocative efficiency, i.e. it also assesses the optimum mix of inputs and outputs.[212]

The data used were taken from the bank report filing system. Deposits and total loans net of loss loans were considered as the outputs. Deposits are represented by the quarterly average of the Czech koruna value of client deposits denominated in all currencies at 1994 constant prices. Total loans net of loss loans comprise the quarterly average of the Czech koruna value of loans at 1994 constant prices denominated in all currencies granted to both resident and non-resident clients, loans to government, loans to and deposits with the central bank and loans to and deposits with other financial institutions. Total loans were adjusted for loss loans.

208 Anca Podpiera and Jiří Podpiera, CNB. The article is based on the authors' paper *Deteriorating Cost Efficiency in Commercial Banks Signals an Increasing Risk of Failure*, CNB Working Paper No. 6, 2005.

209 For the purposes of this paper, the terms "collapse" and "failure" denote a bank's exit from the system.

210 The development of banking sector assets is additionally influenced by numerous other factors, such as the business cycle, methodological changes etc.

211 CAMELS is a composite rating consisting of C-capital, A-asset quality, M-management, E-earnings, L-liquidity and S-market risk. ORAP stands for the Organization and Reinforcement of Preventive Action. For more information on the systems, see, for example, Sahajwala and Bergh (2000).

212 For more details on the measurement of cost efficiency in banks, see, for example, Berger and Humphrey (1997).

The prices of labour, physical capital and borrowed capital were considered as the input prices. The price of labour was calculated as the unit price of labour, i.e. the quarterly average of the total expenses for employees divided by the end-of-quarter number of employees. The price of physical capital was calculated as the quarterly average of expenses for rents, leases, amortisation and materials divided by fixed assets. And finally, the price of borrowed capital is the quarterly average of interest expenses on capital borrowed from the government, central bank, other banks and clients and on securities issued per unit of such capital.

The study focuses on the hypothesis of whether banks that show the lowest cost efficiency (i.e. the worst cost management) fail. In order to assess relative cost efficiency (to estimate the cost frontier function) we use three stochastic parametric methods: the Stochastic Frontier Approach (SFA), the Fixed Effects Model (FEM) and the Random Effects Model (REM).[213]

The cost frontier function is estimated using the translog function. The function is the most commonly estimated one in the literature due to its sufficiently flexible functional form (Taylor expansion around the mean), which has proven an effective tool for empirical analysis of cost efficiency:

$$ln\mathrm{TC_i} = \alpha_0 + \sum_j^l \beta_j \ln Y_j + \frac{1}{2}\sum_j^2\sum_k^2 \beta_{jk} \ln Y_j Y_k + \sum_m^3 \gamma_m \ln w_m + \frac{1}{2}\sum_m^3\sum_n^3 \gamma_{mn} \ln w_m w_n + \sum_j^2\sum_m^3 \rho_{jm} \ln Y_j \ln w_m + v_i \quad (1)$$

where v_i represents composite noise and TC denotes total operating costs, i.e. the sum of expenditures incurred for labour, physical capital and borrowed funds. The vector of input prices, i.e. wages, price of physical capital and price of borrowed funds, is denoted by w. Y is the vector of outputs, comprising deposits and total loans net of bad loans.

The essence of the stochastic frontier approach to cost efficiency is the hypothesis that banks incur cost shocks that may be both positive and negative, hence are symmetrically distributed. However, in addition to such fluctuations in costs, banks show differences in cost management efficiency. These systematic differences represent a measure of cost management inefficiency relative to the most efficient bank. The different methods of identification of this systematic difference in costs have some conceptual differences, so the analysis uses all three methods, including a comparison of their results. The methods are applied to yearly panels of quarterly data for all banks operating in each year of the banking system transformation period 1994–2003.

Estimates of the mean cost efficiencies in three-year periods in the Czech banking sector are set out in Table 2 below. The data in the table express the percentage of expenses that the most efficient bank would need to achieve the output of the average bank. An increase (decline) in the average over time indicates improving (deteriorating) cost management in the banking sector, as it means the average bank has reduced (increased) its lag behind the bank with the highest quality cost management.

Tab. 2 – Statistics of estimates of cost efficiency

		1994–1996	1997–1999	2000–2002
Stochastic frontier approach	Avg.	0.47	0.43	0.56
	S.D.	0.14	0.18	0.14
	Min	0.18	0.21	0.32
Random effects model	Avg.	0.61	0.47	0.57
	S.D.	0.13	0.17	0.14
	Min	0.29	0.24	0.34
Fixed effects model	Avg.	0.39	0.37	0.44
	S.D.	0.15	0.19	0.18
	Min	0.15	0.09	0.19
Sample of banks	Number	45	37	32

213 These methods are described in detail in Bauer *et al.* (1998).

As the table shows, all three methods indicate a decline in the mean cost efficiency of the banking system over the period 1997–1999 and a renewed increase in the following years. The improved cost management was partly due to the collapse of inefficient banks and partly to other factors (consolidation of the banking sector, privatisation of state-owned banks, new managements in many banks introducing international know-how leading to improved efficiency, the introduction and refinement of automated control systems, etc.).[214]

An analysis of failing banks in the cost efficiency rank-order reveals that two years prior to failure, 56% of these banks were in the bottom cost efficiency quartile and 23% of them were in the second worst quartile. One year prior to failure, however, 83% of the banks that went on to fail were located in the bottom cost efficiency quartile. The observation supports the idea that cost efficiency may be an important indicator of bank failure.[215] In order to test the statistical significance of the relationship between cost efficiency and failure risk, the Cox proportional hazards model was used.

The data structure allows us to study jointly the risk of failure and the time to failure. The Cox proportional hazards model, applied to describe the process of joint assessment of the risk of failure and the time to failure, is defined as follows:

$$\lambda(t|z)=\lambda_0(t)e^{z\delta}, \qquad (2)$$

where $\lambda(t|z)$ is the hazard rate, which represents the probability of failure in a given (short) time interval. $\lambda_0(t)$ is the baseline hazard faced by a specific bank at zero cost efficiency, z is a vector of the measured explanatory variables (relative cost efficiencies) and δ is a vector of relevant parameters.

The estimated hazard rate, the probability of failure in a given (short) time interval, is conditional on the bank surviving until time *t* without failing. It is based on empirical observations of continuous operation of the bank until time *t* (the dependent variable takes the value zero – the empirical probability of failure equals zero) and the occurrence of failure at time *t+1* (the dependent variable takes the value one – the empirical probability of failure is certainty). We test whether the hazard rate is determined by cost efficiencies in alternative efficiency estimation specifications. Table 3 summarises the results of the estimates.

Tab. 3 – Cox proportional hazards model (coefficients)

	EFF	Log-likelihood	ps-R2
HR=f(SFA)	-4.96(1.42)***	-78.79	0.10
HR=f(REM)	-7.71(1.88)***	-75.91	0.14
HR=f(FEM)	-3.97(1.58) **	-82.27	0.06

Note: HR stands for hazard rate; EFF denotes cost efficiency; standard deviations are in parentheses; number of observations: 326; failures: 19. Asterisks denote significance level: **5% and *** 1%. The significance level represents the probability that the estimated coefficient is in fact zero. The lower the significance level, the higher the probability that the estimated coefficient is different from zero.

The results of the estimates suggest that increasing relative cost efficiency proportionately reduces the baseline hazard (in this case the maximum risk of bank failure). The pseudo-variance explained by the model relative to the total variance of the data is as high as 14% for efficiency as measured by the REM. The results therefore confirm that cost efficiency significantly explains the risk of failure of banks regardless of the method used for estimating cost efficiency, i.e. the SFA, FEM or REM. The coefficients on the variable EFF (cost efficiency) are negative and significant, implying that a decrease in relative cost efficiency (worse cost management) increases the risk of bank failure.[216]

In conclusion, we can say that relative cost efficiency proved to be a relevant indicator of the risk of bank failure. One year prior to failure the vast majority of failing banks ranked among the worst performing banks in terms of cost management. Relative cost efficiency scores can therefore be used in early warning systems to warn of the failure of individual banks.

214 Bank failure can also be influenced, among other things, by the macroeconomic environment and its effect on the rate of default on loans provided. The issue of credit risk in relation to macroeconomic parameters is the subject of the separate article *Macroeconomic Credit Risk Model* in this Report.

215 The analysis also includes foreign branches of banks in the Czech Republic. Such institutions do not necessarily pursue profit maximisation or cost minimisation directly, as they primarily fulfil objectives set by their foreign parent and draw on its funds. The inclusion of these institutions may therefore "dilute" the results of the model somewhat.

216 The sign of the correlation between cost efficiency and risk of failure is of primary importance, as the contribution to the hazard rate will depend on the magnitude of the cost efficiency score.

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ABBREVIATIONS

AFAM ČR	Association of Funds and Asset Management of the Czech Republic
AKAT	Czech Capital Market Association
APF ČR	Association of Pension Funds of the Czech Republic
ATM	automated teller machine
BIS	Bank for International Settlements
BRIBOR	Bratislava InterBank Offered Rate
BUBOR	Budapest InterBank Offered Rate
Bund	German government bond
ČAP	Czech Insurance Association
CAR	capital adequacy ratio
CEA	Comité Européan des Assurances
CEBS	Committee of European Banking Supervisors
CEC5	Central and East-European Countries (Czech Republic, Hungary, Poland, Slovakia and Slovenia)
CEIOPS	Committee of European Insurance and Occupational Pensions Supervisors
CERTIS	Czech Express Real Time Interbank Gross Settlement System
CESR	Committee of European Securities Regulators
ČLFA	Czech Leasing and Finance Association
CNB	Czech National Bank
CRC	Central Register of Credits
CSD	Central Securities Depository
CZEONIA	Czech OverNight Index Average
CZK	Czech koruna
CZSO	Czech Statistical Office
DJ Stoxx 50	Dow Jones Stoxx 50 (European stock market index)
DJIA	Dow Jones Industrial Average (US stock market index)
EBRD	European Bank for Reconstruction and Development
EC	European Community
ECB	European Central Bank
EIB	European Investment Bank
EONIA	Euro OverNight Index Average
ESCB	European System of Central Banks
EU	European Union
EU-12	euro area countries
EU-25	EU countries
EUR	euro
EURIBOR	Euro InterBank Offered Rate
FDI	foreign direct investment
FRA	forward rate agreement
FSAP	Financial Sector Assessment Program
FVO	fair value option
GDP	gross domestic product
HI	Herfindahl index
HUF	Hungarian forint
IAS/IFRS	International Accounting Standards/International Financial Reporting Standards
IBRD	International Bank for Reconstruction and Development
IF	investment firm
IRI	Institute for Regional Information

LGD	Loss Given Default
LIBOR	London InterBank Offered Rate
LTV	loan-to-value ratio
MF CR	Ministry of Finance of the Czech Republic
MNB	Magyar Nemzeti Bank (the Hungarian central bank)
NACE	industrial classification of economic activities
NMS-8	New Member States (excluding Malta and Cyprus)
O/N	over-night
OECD	Organisation for Economic Co-operation and Development
OMF	open-ended mutual fund
P/E ratio	price to earnings ratio
PD	probability of default
PLN	Polish zloty
PRIBOR	Prague InterBank Offered Rate
PSE	Prague Stock Exchange
PX-50	Czech stock market index
QIS	Quantitative Impact Study
RoA	return on assets
RoE	return on equity
S&P 500	Standard & Poor's 500 (US stock market index)
SICAV	Société d'Investissement à Capital Variable
SITC	Standard International Trade Classification
SKD	Short-Term Bond System
SKK	Slovak koruna
SKONIA	Slovak OverNight Index Average
SME	small and medium-sized enterprises
SSS	securities settlement system
UCITS	Undertakings for the Collective Investment of Transferable Securities
USD	US dollar
VA	value added
VAT	value added tax
WIBOR	Warsaw InterBank Offered Rate

Abbreviations of city names (CHART III.23):

BRN	Brno
CB	České Budějovice
HK	Hradec Králové
JIH	Jihlava
KV	Karlovy Vary
LIB	Liberec
OLC	Olomouc
OST	Ostrava
PAR	Pardubice
PHA	Praha
PLZ	Plzeň
UnL	Ústí nad Labem
ZLN	Zlín

Country abbreviations:

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
CR	Croatia
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
LT	Latvia
LU	Luxembourg
LV	Lithuania
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
TR	Turkey
UK	United Kingdom
USA	United States

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Na Příkopě 28
115 03 Prague 1
CZECH REPUBLIC

Contact:
COMMUNICATIONS DEPARTMENT
Tel.:+420 22441 3494
Fax: +420 22441 2179

www.cnb.cz

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