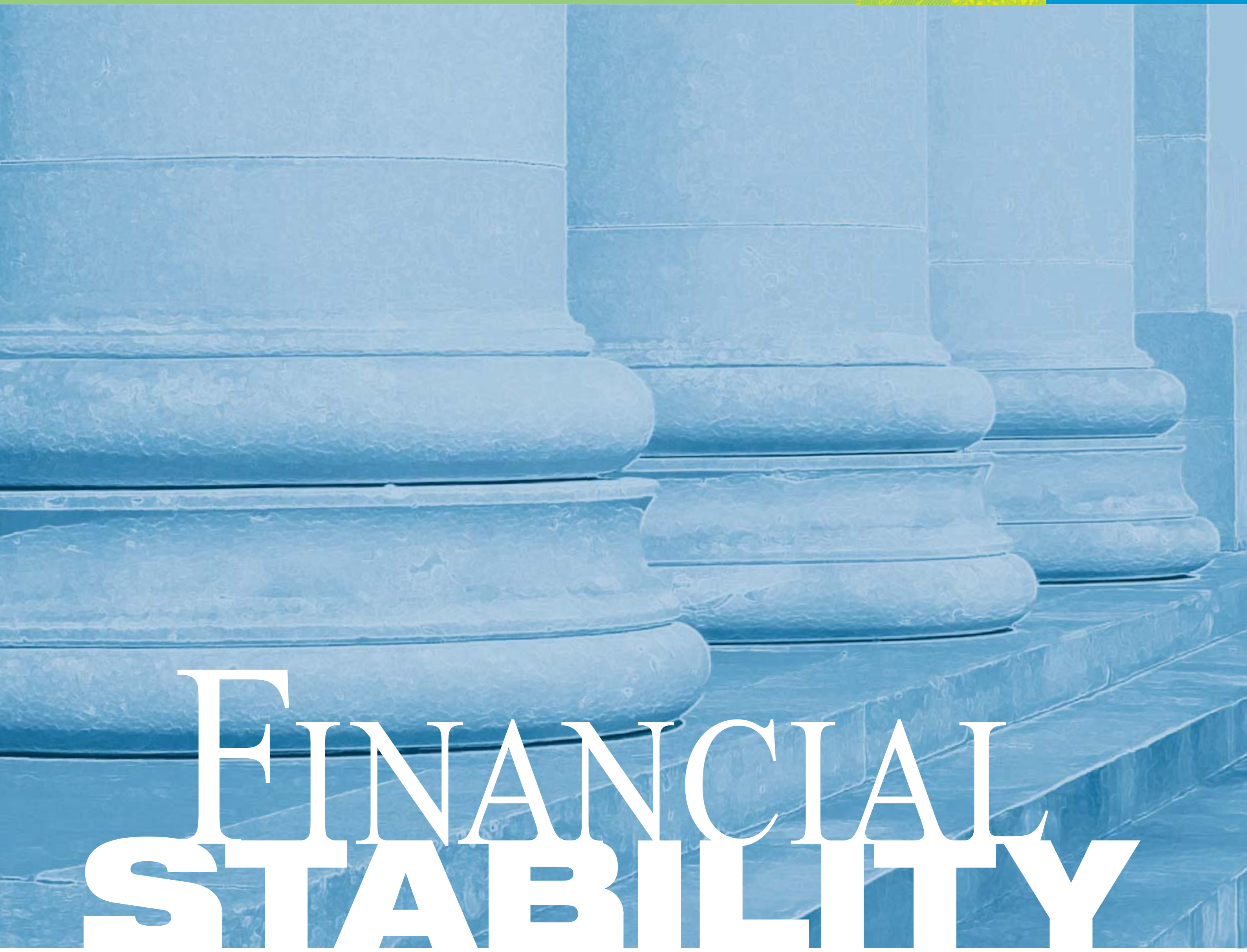
No.
3
Year 2
VIII 2009



FINANCIAL STABILITY

CROATIAN NATIONAL BANK

CROATIAN NATIONAL BANK

Financial Stability

No. 3, Zagreb, August 2009

PUBLISHER
Croatian National Bank
Publishing Department
Trg hrvatskih velikana 3, 10002 Zagreb
Phone: 385-1-4564-555
Contact phone: 385-1-4565-006
Fax: 385-1-4564-687

WEBSITE
http://www.hnb.hr

Those using data from this publication are requested to cite the source.

Any additional corrections that might be required will be made in the website version.

Printed in 450 copies

ISSN 1846-9264

Contents

Introductory Remarks 5

Overall Assessment of the Main Risks and Challenges to Financial Stability Policy 7

Macroeconomic Environment 10

Box 1 Determinants of Changes in Risk Premiums for European Emerging Markets 17

Box 2 What Affects CDS Spreads for Countries and Banks in the Central and Eastern European Region? 19

Box 3 Preliminary Financial Accounts for Croatia 21

Household Sector 23

Box 4 In Search for Subprime Loans to Households 26

Real Estate Sector 28

Non-Financial Corporate Sector 30

Box 5 Initial Measurement of Corporate Sector Credit Risk 34

Banking Sector 37

Box 6 Revision of the Stress-Testing Methodology 46

List of Figures and Tables 50

Introductory Remarks

Finance plays a key role in the allocation of resources, i.e. the process of transforming savings into investments, and therefore in economic growth and an increase in the overall level of social welfare. At the same time, as finance is based on confidence, it is inherently exposed to a high degree of uncertainty, i.e. cyclical swings in the perceptions and behaviour of financial market participants. As financial crises create considerable economic and social costs, the maintenance of financial stability has the character of a public good and is thus an important economic policy objective.

Financial stability is characterised by the smooth functioning of all financial system segments (institutions, markets, and infrastructure) in the resource allocation process, in risk assessment and management, payments execution, as well as in the resilience of the system to sudden shocks. This is why the Act on the Croatian National Bank, in addition to the main objective of the central bank – maintenance of price stability and monetary and foreign exchange stability – also lists among main central bank tasks the regulation and supervision of banks with a view to maintaining the stability of the banking system, which dominates the financial system, as well as ensuring the stable functioning of the payment system. Monetary and financial stability are closely related – monetary stability, which the CNB attains by the operational implementation of monetary policy, performing the role of the bank of all banks and ensuring the smooth functioning of the payment system, lowers risks to financial stability. At the same time, financial stability contributes to the maintenance of monetary and macroeconomic stability by facilitating efficient monetary policy implementation.

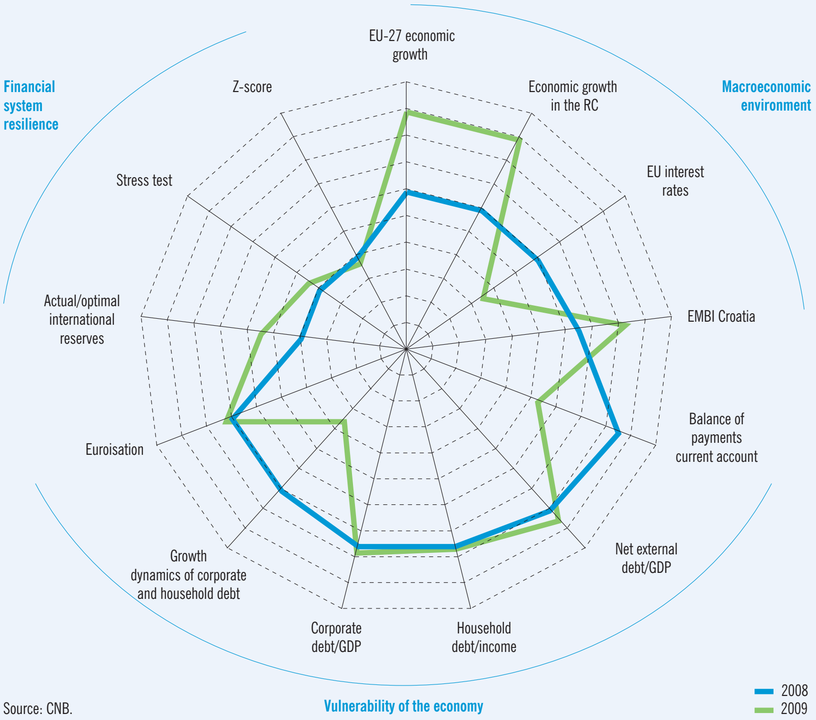
The CNB shares the responsibility for overall financial system stability with the Ministry of Finance and the Croatian Financial Services Supervisory Agency (HANFA), which are responsible for the regulation and supervision of non-banking financial institutions. Furthermore, owing to the high degree of banking system internationalisation, which is reflected in foreign ownership of the largest banks, the CNB also cooperates with the home regulatory authorities and central banks of parent financial institutions.

The publication Financial Stability continues from the former publication Macroprudential Analysis, but puts more emphasis on future developments in assessing financial stability. It analyses the main risks to banking system stability stemming from the macroeconomic environment of credit institutions and the situation in the main borrowing sectors, as well as the credit institutions' ability to absorb potential losses should these risks materialise. Also discussed are CNB measures to preserve financial system stability. The analysis focuses on the banking sector due to its predominant role in financing the economy.

The purpose of this publication is systematically to inform financial market participants, other institutions and the general public about the vulnerabilities and risks threatening financial system stability in order to facilitate their identification and understanding as well as to prompt all participants to take adequate safeguards should these risks actually occur. It also aims at enhancing the transparency of CNB actions to address the main vulnerabilities and risks and strengthen financial system resilience to potential shocks that could have significant negative impacts on the economy. This publication should encourage and facilitate a broader professional discussion on financial stability issues. All this together should help maintain confidence in the financial system and thus its stability.

Overall Assessment of the Main Risks and Challenges to Financial Stability Policy

Figure 1 Financial Stability Map



Source: CNB.

Following a serious deterioration in the international and domestic macroeconomic environment in late 2008 and early 2009, the second half of the year is expected to see a gradual recovery, in line with global trends. The recession's impact on the banking sector will be delayed and could peak towards the end of the year. However, the expected deterioration in the quality of banking sector assets should not pose a threat to the satisfactory level of financial sector stability.

The main financial stability indicators for Croatia are summarised in Figure 1. The financial stability map shows changes in key indicators of the possibility of occurrence of risks related to the domestic and international macroeconomic environment and vulnerability of the domestic economy, as well as indicators of financial system resilience that can eliminate or reduce the costs should such risks materialise. The map shows the most recent market developments or projections of selected indicators and their values in the comparable period, i.e. previous year. For each variable, an increase in the distance from the map centre indicates greater risks or system vulnerability and lesser resilience, as well as a greater threat to stability. Hence, an increase in the map area suggests lower and a decrease in the area suggests higher financial system stability.

As early in the year the financial crisis turned into the deepest global recession since the Great Depression, all influential analysts and international organisations predicted that global GDP would shrink in 2009. The economic contraction hit Croatia as well and its foreign trade volume was sharply reduced, following the trends in EU Member States, which saw a sharp GDP fall in the first quarter of 2009. Thus, 2009 as a whole is expected to see a major economic downturn. However, as highlighted in the discussion on potential risks in the previous edition of Financial Stability, the slowdown in foreign capital inflows played the major role in the Croatian economic slowdown. Its importance is also confirmed by a larger decrease in imports than exports, which will result in a strong positive contribution of net exports to domestic activity and thus alleviate the impact of the domestic demand contraction.

Despite a sharp drop in benchmark eurozone interest rates in late 2008, foreign capital became increasingly expensive and less available to domestic sectors due to a large increase in the risk premium. Still, even in the period when the price of foreign capital peaked and inflows were scarcest, all domestic sectors managed to refinance in full their maturing external liabilities. Coupled with the government bond issue in late May 2009, this further raised the external debt level. In the same period, many countries in the region experienced capital outflows and had to seek support from international financial institutions. Croatia was thus in a slightly better position, which somewhat reduced the challenges for economic policy.

Measures taken in Croatia last autumn helped maintain liquidity and stability in the banking system. However, the domestic currency was under strong depreciation pressures due to slower capital inflows. After having supported banks' foreign currency liquidity through the October abolition of the marginal reserve requirement and the December cut in the reserve requirement rate, in early 2009, the central bank launched a second round of measures to maintain exchange rate stability. This is why the January and February cuts in the rate of the minimum required foreign currency claims, which put at banks' disposal formerly immobilised foreign currency funds, were accompanied by an increase in the percentage of foreign currency reserve requirement that is set aside in kuna and two foreign exchange interventions when the CNB sold EUR 513m to banks within a month. The impact of the latter measures on the contraction of domestic currency liquidity was not sterilised as the creation of domestic currency at repo auctions was restrictive while money market interest rates grew and were extremely volatile. Exchange rate stability was thus preserved. In view of the widespread euroisation of domestic financial liabilities, this stability is also prerequisite for the maintenance of financial stability. Banks thus maintained good business results and relatively high profitability at the beginning of the year. However, the degree of euroisation additionally increased in early 2009 as banks relied on previously immobilised foreign currency assets and foreign loans, which further underscored the need to preserve exchange rate stability.

The release of a portion of banks' foreign currency reserves and the rise in short-term debt led to a somewhat larger gap between actual CNB international reserves and their estimated optimal level. However, the central bank's strategy to rely more on banks' foreign assets and their foreign currency deposits with the CNB to secure foreign currency liquidity and stabilise the exchange rate led to a relatively small decrease in its own net usable international reserves. In addition, since the banks in previous months relied on foreign loans, mostly from their parent banks, the ability to retain such support has considerably improved the assessment of optimal international reserves. Finally, CNB international reserves have been growing since the last foreign exchange intervention in late February, which indicates a trend reversal.

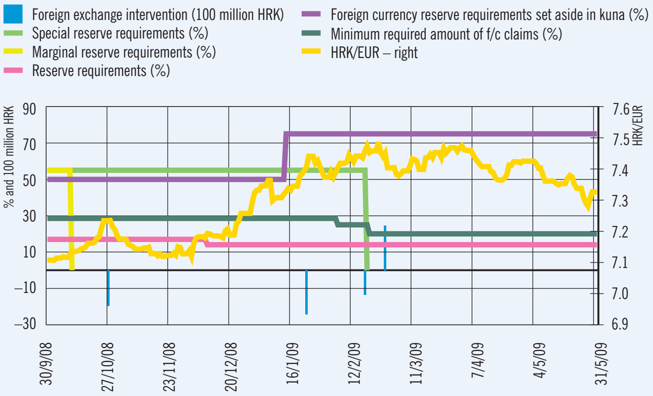
The measures taken by the governments worldwide in late 2008 and early 2009 began to restore investor confidence in the financial markets. Together with the first signs of improvement in business sentiment, this indicates that a global real economic recovery could begin as soon as the second half of 2009. In addition, coordinated efforts of the world's leading economies to strengthen the role of international financial organisations and their decisive support to emerging markets allayed the fears that a number of countries would stop meeting their maturing foreign liabilities. After risk aversion soared in late 2008, investors' risk appetite has begun to return progressively to the level that could be considered normal, which has led to a gradual recovery of international financial flows. However, their levels are still much lower than in the pre-crisis period due to the persistent operating difficulties of several large international banks and the need to reduce the current high level of financial leverage. In Croatia, depreciation pressures began to subside in March, shortly after the foreign exchange intervention in late February whereby the CNB purchased EUR 331m from the banks.

Owing to steady, though markedly smaller than last year, foreign capital inflows and the use of accumulated foreign reserves of the banking sector, the Croatian economic downturn so far has not been sharper than the average GDP contraction recorded in EU Member States. If recovery begins in the second half of the year, a similar GDP fall is also expected for the year as a whole. Still, reduced foreign capital inflows to domestic sectors and a much slower growth in domestic loans necessitate domestic economic adjustment through cuts in consumption and investments. Household debt growth will thus come to a halt in 2009, while corporate debt growth will be much slower. The government's response to external shocks, i.e. the April budget revision that lowered projected revenues and expenditures was delayed and weaker than that of the other sectors, and was probably insufficient in light of the trends expected through to the year-end.

Although a more favourable outcome is now more likely than a less favourable one, the downside risks to the real economy cannot be completely eliminated due to a still high degree of uncertainty. The expected global recovery could be thwarted by any further accumulation of losses in big international banks under the impact of current adverse developments in the real sector. In addition, the under-utilisation of production capacities could negatively affect investments and prolong the recovery phase. Also, domestic risks such as much lower tourism revenues, a larger-than-expected shortfall in fiscal revenues and significant payments on government guarantees for loans to vulnerable industries or swings in investors' sentiments in the international markets could increase foreign funding needs or hamper foreign financing. Against this background, the real adjustment burden should fall on fiscal policy, the adjustment of which should be stronger, and on structural reforms needed to raise potential growth.

So far, the banking sector has weathered the impact of the global financial turmoil extremely well. However, non-performing loans grew slightly early in 2009, while the domestic recession will put an even stronger strain on the quality of bank assets in the near-future. Difficulties encountered by the real sector will be felt with a lag and full crisis impact on the banks' asset quality will probably be seen only later in 2009 and in 2010. Stress tests conducted show that under the baseline macroeconomic scenario the banking sector as a whole would be able to amortise potential losses by its operating income, thus maintaining the level of capital adequacy that would enable credit growth. However, the recession will not symmetrically affect all banks, just as not all banks are equally profitable. This implies that there are certain vulnerable areas within the system. The specific macroeconomic credit risk models assessed here suggest that large universal banks are most resistant; should the baseline macroeconomic scenario materialise, their losses would not affect their current capital adequacy level. In contrast, smaller banks from bank groups oriented to companies or riskier household loans historically react more strongly to macroeconomic shocks and could suffer losses but their capital adequacy ratios would remain satisfactory. Should an even worse macroeconomic scenario materialise, which is becoming less likely, universal banks could suffer losses but their capital adequacy ratio would remain well above the regulatory minimum, while the banks dealing mostly with corporates and households would incur larger losses and their capital adequacy would fall below the regulatory minimum. However, banking sector stability would not be threatened since the latter banks account for a small share of total banking sector assets.

Figure 2 Changes in Key Monetary and Prudential Policy Measures



Source: CNB.

Macroeconomic Environment

A severe economic downturn experienced by most countries around the world in the last quarter of 2008 and the first quarter of 2009 and extremely high risk aversion in the financial markets, which resulted in much slower foreign capital inflows and weakened export demand, have deepened the recession in Croatia. The need for external adjustment was reduced by releasing a portion of international reserves of the monetary sector, which secured external liquidity and exchange rate stability. Monetary policy will continue to focus on the maintenance of overall financial stability, while fiscal policy adjustments should continue in line with overall economic developments.

Macroeconomic Risks

The escalation of the global financial crisis late in the third quarter of 2008 seriously affected the real sectors of almost all global regions.

The freezing of financial markets and the ongoing deleveraging process in the banking system, as well as the ensuing credit contraction led to a dramatic collapse in global trade and a sharp decline in industrial inventories in the following two quarters. Coupled with the ongoing recession in the countries where the real estate market crashed and employment and personal consumption dropped, this led to the most severe drop in industrial production and aggregate economic activity since the Great Depression in almost all developed countries. The countries whose growth model was based on export growth were hit the hardest by the export slump (Table 1).

At the same time, the collapse in export demand in developed markets and interruption of foreign capital inflows led to a sharp economic downturn in most emerging economies, including Croatia (Figure 4).

Economic policy in most developed countries responded by radically relaxing monetary and fiscal policies. A similar, though less radical, approach was followed by some emerging economies, depending on the situation in the public finance sector in particular and financial sector in general (Figure 3 and Table 2).

Still, as their debt is relatively high and credibility in financial markets has yet to be established, most emerging economies had to implement restrictive policies in efforts to reduce external and domestic imbalances to a sustainable level by means of a real adjustment.

Central and South Eastern European countries mostly applied restrictive policies to adjust themselves to reduced foreign capital inflows and export demand, which led to a severe economic contraction. Due to the devastating impact of poor export demand neither could the countries with more room for fiscal stimulus avoid an economic downturn.

The Croatian economy suffered a relatively slight downturn in the last quarter of 2008 due to a moderate decline in domestic demand and exports and a sharp fall in imports arising from a drop in import-intensive demand. A fall in industrial production

Table 1 Economic Growth, Exports and Industrial Production in Selected Developed and Emerging Market Countries

	Annual rate of change in GDP		Quarterly rates of change in GDP, ΔQt/Qt-1		Annual rate of change in exports of goods and services		Annual rate of change in industrial production (seasonally adjusted)	
	2008	2009[a]	Q4/08	Q1/09	Q4/08	Q1/09	12/08	3/09
USA	1.1	–2.9	–1.6	–1.4	–2.9	–16.8	–8.9	–12.5
Japan	–0.6	–5.3	–3.6	–3.8	–23.0	–47.7	–11.3	–22.1
EU (25)	0.8	–4.0	–1.8	–2.4	–1.3	....	–11.9	–18.1
Germany	1.3	–5.4	–2.2	–3.8	–6.2	–21.0	–12.1	–21.7
Italy	–1.0	–4.4	–2.1	–2.6	–8.9	–19.9	–12.9	–25.1
Slovenia	3.5	–3.4	–4.1	–6.4	–4.9	–21.2	–17.8	–19.3
Slovak R.	6.4	–2.6	2.1	–11.4	–11.5	–28.3	–19.5	–20.2
Czech R.	3.2	–2.7	–1.8	–3.4	–8.4	–24.8	–17.1	–18.4
Poland	5.0	–1.4	0.0	0.4	–5.5	–20.1	–9.3	–10.8
Hungary	0.5	–6.3	–1.8	–2.5	–8.9	–26.3	–23.0	–19.6
Estonia	–3.6	–10.3	–5.3	–6.1	–3.1	–25.5	–22.0	–29.1
Latvia	–4.6	–13.1	–4.8	–11.2	–5.4	–18.7	–13.7	–23.7
Lithuania	3.0	–11.0	–1.4	–10.5	22.9	–24.9	–3.2	–21.2
Croatia	2.4	–5.5	–0.2	–6.1	–7.7	–24.1	–5.2	–10.1

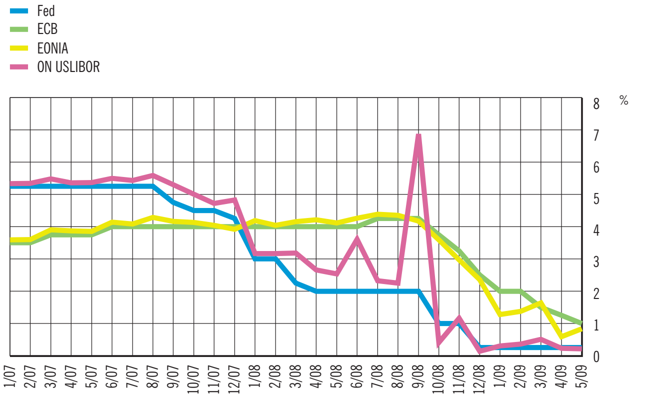
[a] Forecast.
Sources: Eurostat, CBS, CNB and central banks' web sites.

Table 2 Fiscal Balance, Current Account Balance and External Debt of Selected Developed and Emerging Market Countries

	Fiscal balance, as % of GDP (ESA 95)			Current account balance, as % of GDP			External debt, as % of GDP	
	2007	2008	2009[a]	2007	2008	2009[a]	2007	2008
USA	–2.8	–5.9	–12.1	–5.3	–4.7	–2.8		
Japan	–2.5	–2.9	–6.7	4.8	3.2	1.5		
Germany	–0.2	–0.1	–3.9	7.5	6.4	2.3		
Italy	–1.5	–2.7	–4.5	–2.4	–3.2	–3.0		
Slovenia	0.5	–0.9	–5.5	–4.2	–5.9	–4.0	102	105
Slovak R.	–1.9	–2.2	–4.7	–5.4	–6.3	–5.7	55	57
Czech R.	–0.6	–1.5	–4.3	–3.2	–3.1	–2.7	40	38
Poland	–1.9	–3.9	–6.6	–4.7	–5.5	–4.5	51	48
Hungary	–4.9	–3.4	–3.4	–6.4	–7.8	–3.9	97	78
Estonia	2.7	–3.0	–3.0	–18.1	–9.2	–6.5	112	120
Latvia	–0.4	–4.0	–11.1	–22.6	–13.2	–6.7	128	128
Lithuania	–1.0	–3.2	–5.4	–14.6	–11.6	–4.0	72	71
Croatia	–1.4	–1.1	–1.6	–7.6	–9.4	–6.0	78	83

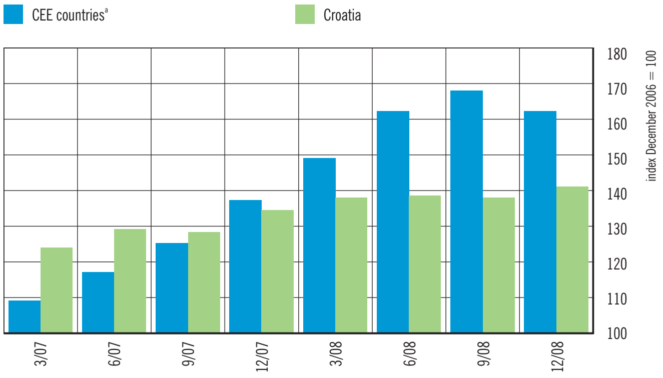
[a] Forecast.
Sources: European Commission, *Economic Forecast*, spring 2009; MoF; IMF, *World Economic Outlook Database*, April 2009 and central banks' web sites.

Figure 3 Fed's and ECB's Key Interest Rates, EONIA and USLIBOR



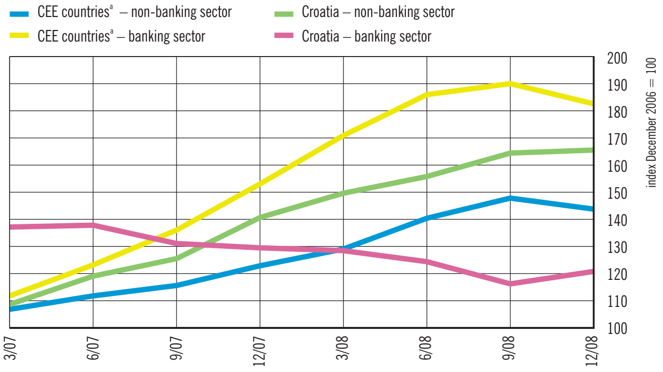
Sources: ECB, Fed and Bloomberg.

Figure 5 BIS Reporting Banks' Claims on Central and Eastern European Countries[a]



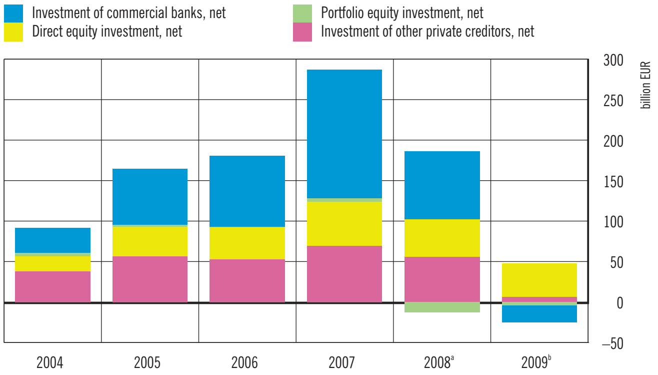
[a] Bulgaria, Czech R., Hungary, Poland, Romania, Slovak R. and Slovenia.
Source: BIS.

Figure 6 BIS Reporting Banks' Claims on Central and Eastern European Countries[a] by Sector



[a] Bulgaria, Czech R., Hungary, Poland, Romania, Slovak R. and Slovenia.
Source: BIS.

Figure 4 Capital Inflows to European Emerging Market Countries



[a] Estimate. [b] Forecast.
Sources: International Institute of Finance, *Capital Flows to Emerging Market Economies*, January 2009 and Bloomberg.

particularly affected capital investments and demand for intermediary goods.

Capital inflows to the corporate sector came to a halt in that period, which also had a limiting effect. However, owing to much larger capital inflows to the banking sector, mostly from foreign parent banks, total capital inflows to Croatia remained positive in that period (Figures 5 and 6).

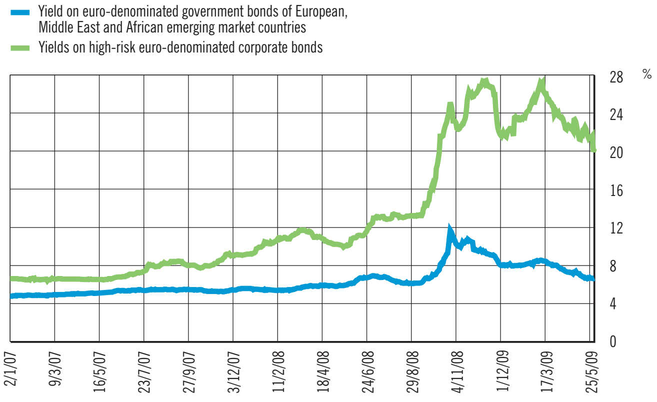
A less pronounced economic downturn was also due to fiscal policy, which financed the increased public sector deficit by borrowing from banks, and to monetary policy, which helped to maintain banking sector liquidity and exchange rate stability by releasing a portion of banks' immobilised foreign currency reserves.

However, in the first quarter of 2009, the Croatian economy entered a strong contraction phase. Exports dropped markedly due to increasingly negative real trends in foreign markets, particularly in developed EU countries, while harsher financing terms both in the international and domestic financial markets sharply reduced corporate and household investments. The slump in personal consumption also continued due to slower wage growth and the rise in unemployment.

In view of the high import intensity of all aspects of demand, a decline in exports and domestic demand led to a major downturn in imports, which, coupled with a fall in the prices of oil, food and other raw materials, contributed to a sharp reduction in the trade deficit.

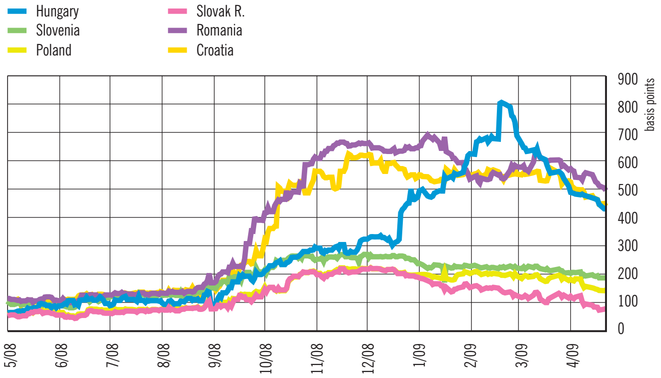
Notwithstanding a slight increase in foreign capital inflows to the corporate sector, total debt held steady in that period due to a virtual cessation of inflows to the banking sector and a reduction in the external debt of the government. Hence, the current account deficit was largely financed by a decline in foreign assets of banks, which was enabled by the lowering of the foreign currency liquidity ratio from 28.5% to 20.0%.

Figure 7 Yields on High-Risk Government and Corporate Bonds



Source: Bloomberg.

Figure 8 Spread on Benchmark Eurobonds of Selected Countries and Benchmark German Bonds Maturing in 2011



Source: Bloomberg.

Against the background of an overall economic slump, a decline in tax revenues raised the fiscal deficit, which was financed in the domestic market due to the closure of foreign capital markets. At the same time, banks directed the bulk of released foreign currency liquidity to the government, which used it to refinance maturing debt. In such circumstances, no room was left for additional fiscal stimulus to the faltering economy.

In the first quarter of 2009, released foreign currency liquidity reserves of the monetary sector provided major support to the maintenance of external liquidity and exchange rate stability, and thus overall financial stability as well as to the mitigation of unavoidable real adjustments in the face of severe external shocks.

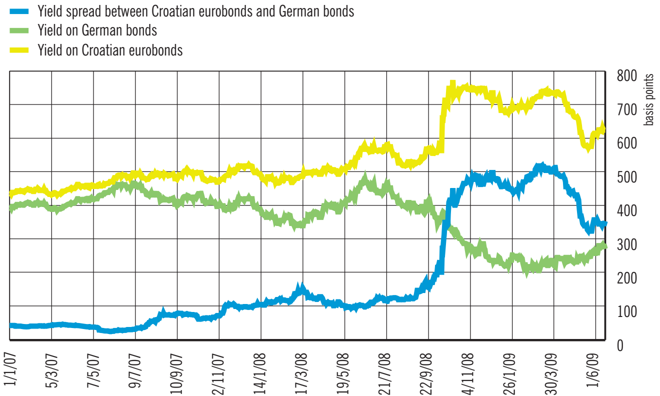
Economic policy measures in developed countries, which aimed at reviving the main financial market segments and boosting liquidity and solvency of financial institutions, began to yield the first obvious results in the second quarter of 2009.

This is evidenced by the drop in interest rates, heightened activity in the interbank market and the gradual growth in loans to non-banking sectors. A decline in risk aversion is also evidenced by a pickup in activity in the corporate bond market and a sharp fall in risk premiums (Figures 3 and 7).

Similar trends observed in the market for emerging market sovereign bonds were also encouraged by strong coordinated financial support of the G-20 countries, which was channelled through the IMF and other international financial institutions and focused on emerging market countries, particularly those in Central and South Eastern Europe (Figures 8, 9, 10 and 11 and Box 2).

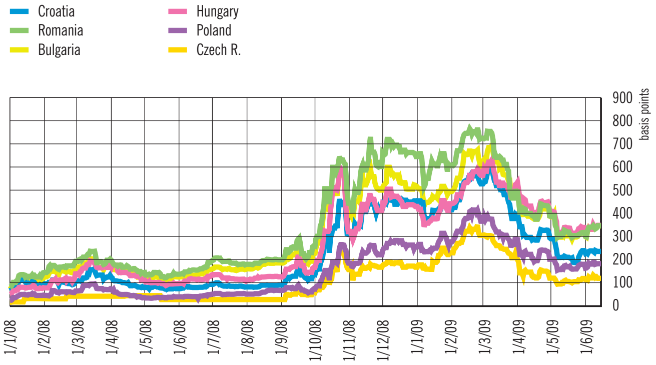
A gradual stabilisation of the financial sector and revival of financial markets combined with effective strengthening of fiscal stimulus to demand have begun to influence the real sector

Figure 9 Yields on Croatian and Benchmark German Bonds Maturing in 2014 and Their Spread



Source: Bloomberg.

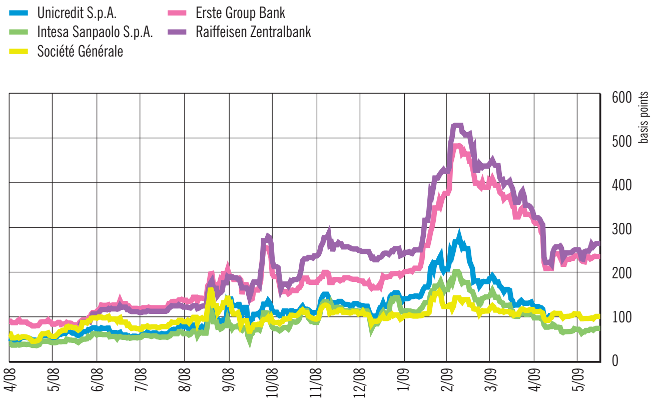
Figure 10 CDS[a] Spreads for Selected Countries



[a] Credit default swaps (CDS) spread is an annual premium that a CDS buyer pays for protection against credit risk associated with an issuer of an instrument.

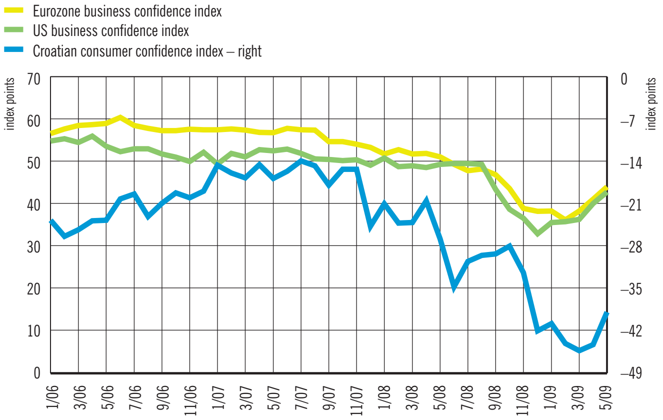
Source: Bloomberg.

Figure 11 CDS Spreads for Parent Banks of Croatian Banks



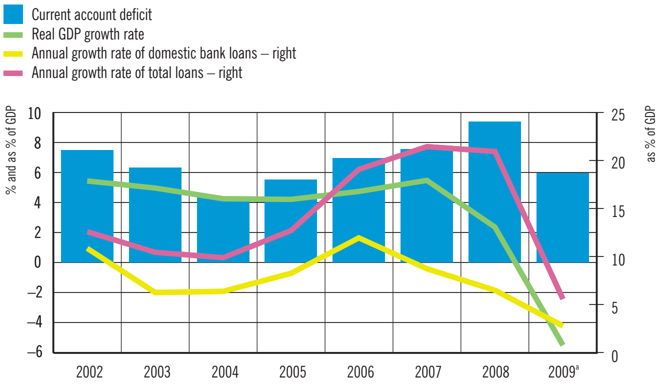
Source: Bloomberg.

Figure 12 Business and Consumer Confidence Indices



Sources: Bloomberg and CNB.

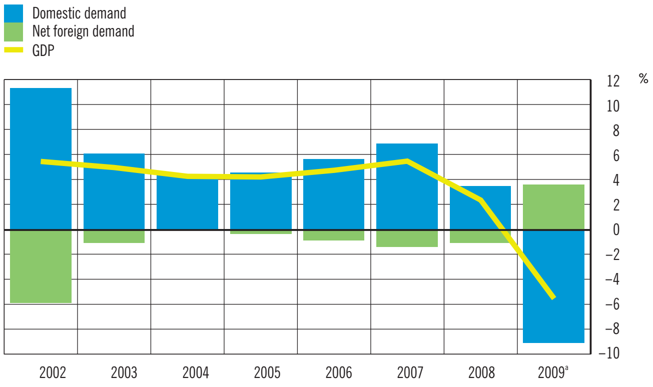
Figure 13 Foreign Capital Inflows and GDP Growth in Croatia



a Forecast.

Sources: CNB and CBS.

Figure 14 GDP Growth Pattern (contribution to growth)



a Forecast.

Source: CBS.

in developed countries. This sector has seen the first signs of reversal of the negative trends, while business confidence indicators suggest that recovery could begin in the second half of 2009 (Figure 12).

Such trends in the environment have opened up the possibility that, with prudent economic policy, Croatia too may start creating a foundation for the reversal of the trend and gradual economic recovery in the remainder of the year.

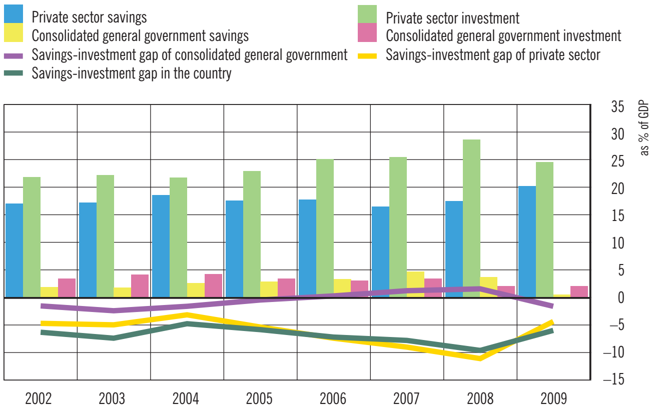
However, notwithstanding the assumed stabilisation and trend reversal, aggregate economic activity in terms of GDP is projected to fall an average of 5% in 2009 relative to 2008, due to a sharp downturn in the first quarter.

The main brunt of the real adjustment in 2009 will be borne by corporate sector investment and household consumption, which will record a sharp real decline. Coupled with a large expected decline in exports, this will contribute to a major fall in imports and the consequent cut in the current account deficit from 9.5% in 2008 to some 6% of GDP in 2009 (Figures 13, 14 and 15).

Assuming a smooth refinancing of maturing external debt and no significant net borrowing, the current account deficit will be largely financed by the decline in foreign exchange assets of the monetary sector and, to a lesser extent, FDI inflows coming mostly from retained earnings of foreign-owned corporates and banks (Figures 16, 17 and 18).

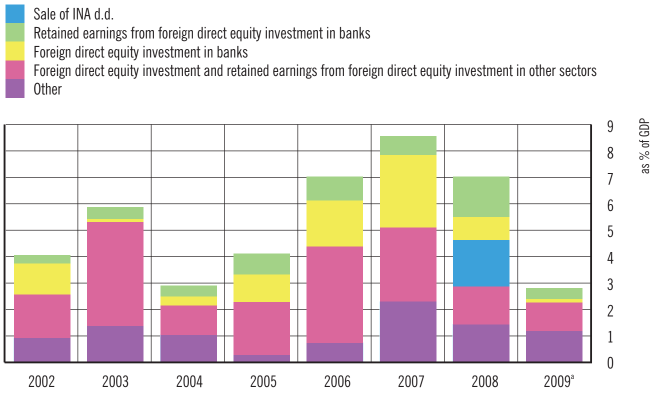
The fall in foreign exchange assets of the monetary system will be kept within limits that do not threaten the maintenance of the country's external liquidity and exchange rate and financial sector stability, which are the main tasks of the monetary authorities (Figures 19, 20, 21 and 22).

Figure 15 Savings and Investment – Total and by Sector



Sources: MoF and CNB (estimate).

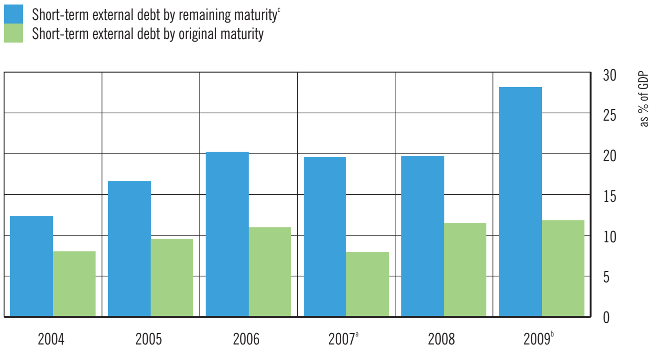
Figure 16 Structure of Foreign Direct Investment



[a] Forecast.

Source: CNB.

Figure 17 Short-Term External Debt

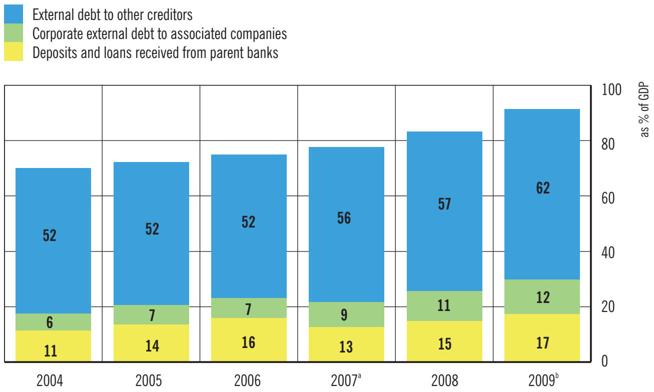


[a] Since end-2007, external debt has been calculated according to the new methodology. [b] Forecast.

[c] Short-term external debt by remaining maturity at the end of the current year is the sum of long-term debt maturing in that year and the balance of short-term debt at the end of the previous year.

Source: CNB.

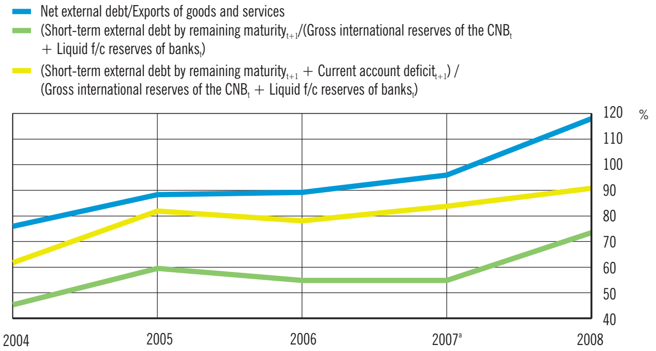
Figure 18 Total External Debt by Creditor



[a] Since end-2007, external debt has been calculated according to the new methodology. [a] Forecast.

Source: CNB.

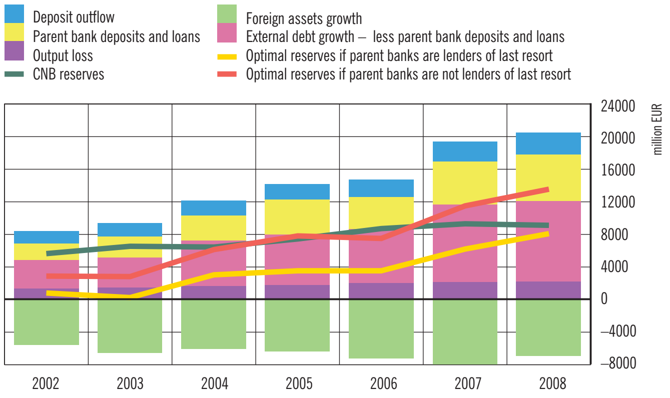
Figure 19 Selected Indicators of External Vulnerability



[a] Since end-2007, external debt has been calculated according to the new methodology.

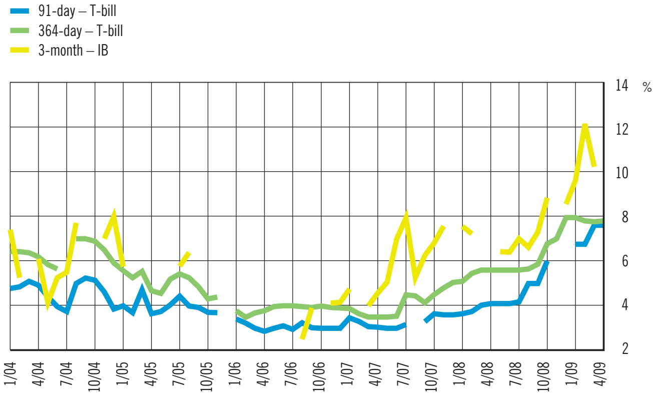
Source: CNB.

Figure 20 Contribution of Individual Components of Optimal International Reserves



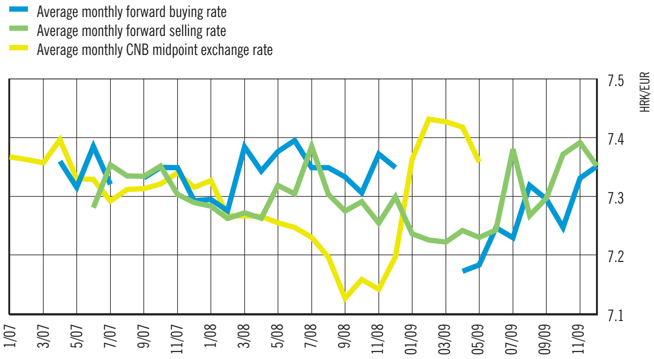
Source: CNB.

Figure 21 Average Interest Rates on T-Bills and in the Interbank Money Market



Sources: CNB and MoF.

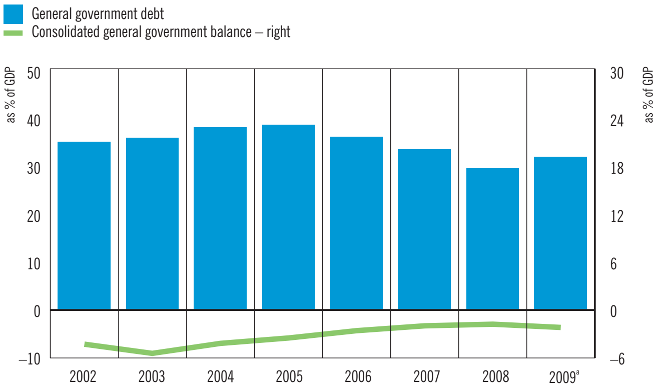
Figure 22 Kuna/Euro Exchange Rate – Spot and Forward



Note: The figure shows forward exchange rates according to the value dates that were contracted at least 180 days prior to that date and in an amount not less than EUR 0.5m.

Source: CNB.

Figure 23 General Government Fiscal Position



[a] Estimate.

Sources: MoF and CNB.

The budget revision of April 2009, which adjusted public spending to the expected negative impact of the recession on tax revenues, kept the fiscal deficit at a moderate level. Also announced was the possibility of further public expenditure cuts in case of a sharper-than-expected economic fall. Fiscal policy thus made an important step towards strengthening its credibility, which was also appreciated by the international financial markets, in which EUR 750m worth of 5-year eurobonds with a yield of 6.5% was placed successfully in late May (Figure 23).

Still, to preserve and reinforce fiscal policy credibility, fiscal consolidation will have to be further strengthened in the years ahead. This assumes the implementation of public sector reforms and reforms of the shipbuilding sector and public enterprises to curtail subsidies and ensure an efficient system of state and public administration and services that will be sustainable in the long-run.

Fiscal consolidation creates room for stronger private sector investment, which is the main prerequisite for long-term economic growth that does not threaten the country's external solvency. To preserve external debt sustainability in the forthcoming period, credible economic policy will have to ensure that GDP grows faster than external debt. This means that a relatively smaller external debt increase will have to provide as much room for private investment as possible, largely at the expense of slower growth in public spending and debt.

Also, prudent fiscal policy and the healthy banking system together with the ongoing reforms that foster a swift completion of Croatia's EU accession process are the key to maintaining the country's credit rating, i.e. the confidence of foreign creditors and investors, which is necessary to ensure favourable foreign borrowing terms and larger FDI inflows and thus accelerated sustainable growth and real convergence with the EU.

Box 1 Determinants of Changes in Risk Premiums for European Emerging Markets

The cost of borrowing in the international markets paid by emerging market countries trended down steadily in recent years. At the same time, the global risk perception of investors was sharply reduced, decreasing also the global risk premium. These trends were reversed in the second half of 2007 with the emergence of problems in the US subprime mortgage market, while the escalation of the crisis after the Lehman Brothers collapse in late 2008 triggered a drastic increase in required yields on emerging market eurobonds. The question is to what extent developments in yield spreads are attributable to developments in fundamental indicators and how much are they affected by investors' perception not based on measurable data.

Although funding costs generally moved in the same direction for all observed countries[1] in the reference period, the differences in the risk perception of individual countries are reflected in the various yields required.

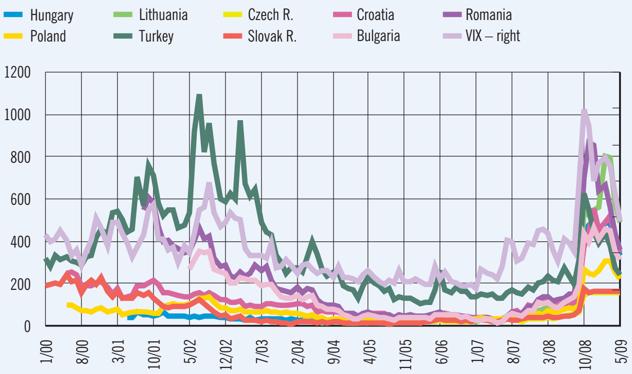
The JPMorgan Euro EMBI Global indices were used as indicators of yield spreads for observed countries, i.e. yield spreads on these indices, which are reliable indicators of yield movements and total returns for emerging market bonds. To ensure their representative quality and mutual comparability, the indices include only euro-denominated, straight fixed coupon bonds issued by sovereign and quasi-sovereign entities with a remaining maturity of over 2.5 years. Also, to ensure that prices of the instruments included are reliable, JPMorgan requires that they are regularly listed by brokers and dealers in the secondary market.

A model applying three groups of factors was assessed to determine the extent to which yield movements can be explained by available quantitative variables and to what extent they are affected by factors that cannot be precisely defined and measured.

The first group relates to macroeconomic indicators and external vulnerability indicators. Their deterioration should raise foreign borrowing costs. The second type of factor relates to the EU and EMU convergence process. Previous empirical research has shown a strong correlation between the progress in the EU and EMU accession process and the credibility of macroeconomic policies, which is then reflected in a lower required yield on external borrowing. Furthermore, a high degree of financial market globalisation increased the correlations between prices of various types of assets. Therefore, movements in global financial variables strongly affect yield spreads, particularly in the short run. The VIX index, which is a measure of the implied volatility of S&P500 index option prices, is often referred to as the fear index, i.e. an indicator of investors' risk aversion. This index's level was relatively low in recent years, but sharply grew at the onset of the crisis.

A model was assessed on a panel of eight Central and Eastern European countries for the period between the first quarter of 2000 and the last quarter of 2008 to determine how much and which of the above mentioned groups of factors affected yield spread movements. Macroeconomic vulnerability indicators used were: the consumer price index (CPI) growth rate, changes in the nominal exchange rate of the domestic currency against the euro, the total external debt-to-international reserves ratio, the exports-to-GDP ratio and changes in the current account balance-to-GDP ratio. The VIX was used to indicate the global risk perception, while a tailor-made variable was used to describe the progress in EU and EMU accession. Within the accession process, five steps in institutional integration were identified: application for membership, beginning of negotiations, accession to the EU, entry to the ERM II and introduction of the euro as the national currency.

Figure 1 Spreads on Emerging Market Sovereign Debt and the VIX Index



Sources: Bloomberg and J.P. Morgan.

With regard to the impact of individual variables, the model results are in line with expectations. The increase in external vulnerability in terms of the rise in total external debt-to-international reserves ratio and the fall in the exports-to-GDP ratio results in a higher required yield. A fall in GDP relative to its equilibrium level also increases foreign borrowing costs. An increase in inflation and depreciation of the domestic currency also act in the same direction. A greater ability to generate foreign income reduces yield spreads, while the GDP gap can change future growth expectations and thus affect debt sustainability perceptions. The rise in inflation could point to weaknesses in economic policy

Table 1 Regression Model Results

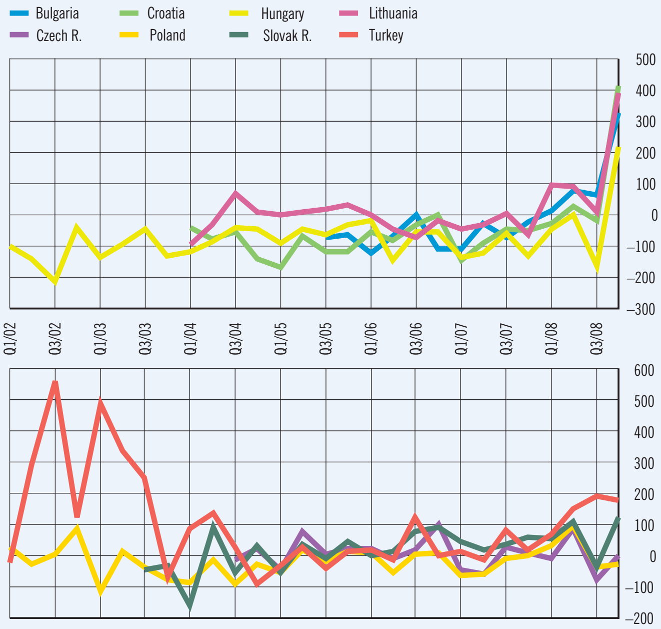
Independent variable	Coefficient
GDP gap	–5.7
Inflation	20.3
Percentage change in the kuna/euro exchange rate	7.1
Ratio of total external debt to international reserves	0.3
Percentage change in the exports-to-GDP ratio	–9.2
Step in the EU and EMU accession process	–45.7
Change in the VIX index	6.6
Constant	93
Adjusted R^2	0.58

Note: All variables are significant at the level of 5%.
Source: CNB calculations.

---

[1] Included countries for which EMBI index data were available are Bulgaria, Croatia, the Czech Republic, Hungary, Lithuania, Poland, the Slovak Republic and Turkey.

Figure 2 Model Residuals by Country



Source: CNB calculations.

management, while domestic currency depreciation reduces domestic debtors' ability to pay debt denominated in or indexed to foreign currencies. Macroeconomic indicators are by their nature less volatile than financial variables and, as expected, have a lesser impact on short-term changes in yield spreads. Nevertheless, sudden changes in GDP of most countries over the last quarter of 2008 can account for some changes in required yields.

Convergence to the EU and EMU strongly influences the narrowing of yield spreads. Other countries' experience shows that the period from the beginning of accession negotiations to euro adoption can last for more than a decade. Thus, it cannot account for short-term fluctuations but it can explain some differences in required yields among countries. A country's convergence to the EU improves its credibility in the international financial market as investors assume that the country will implement prudent macroeconomic policies to maintain imbalances at a sustainable level.

An increase in the global risk premium (in terms of the VIX index) also exerts a strong influence on foreign borrowing costs. The assessed model shows that sudden changes in required yields can be attributed to a large extent to changes in the VIX, which largely explains the deterioration seen at end-2008.

The research revealed another interesting fact related to the behaviour of the model residuals (Figure 2). In the case of Bulgaria, Croatia and Hungary, deviations were mostly negative in the reference period, signalling strong investor risk appetite, but suddenly turned positive in late 2008. This implies that part of the spread between required yields cannot be explained by the model variables but is due to excessive investor pessimism.

A sudden increase in deviations, which was particularly strong in some countries, indicates a major behavioural change of investors who began to make distinctions between individual countries in the region. However, the increase in required yield spreads was larger than implied by the model variables, which indicates either investor panic or the then-expected drastic deterioration of macroeconomic fundamentals caused by the current crisis. Although data on developments in macroeconomic indicators at the end of the first half of 2009 are not available, a sharp decrease in the EMBI yield spread confirms that investors' reaction was excessive and that their deviation, which is larger than could be expected based on macroeconomic fundamentals, would probably not last.

Box 2 What Affects CDS Spreads for Countries and Banks in the Central and Eastern European Region?

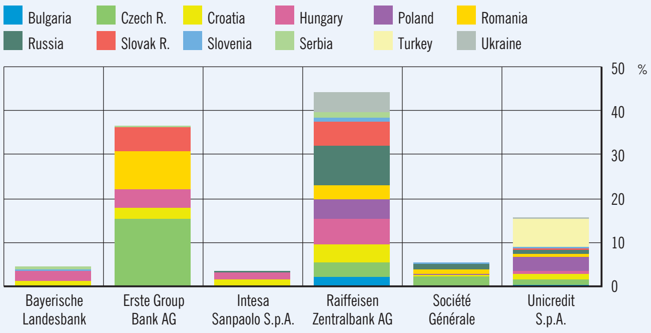
In early 2009, various international financial institutions and rating agencies[1] frequently analysed risks threatening individual European banks due to their large exposure to the Central and Eastern European region, which created an impression that the region itself and banks operating in it would be hit particularly hard by the financial crisis. In an effort to calm down investors and the general public, banks with the highest exposures to the region responded by swiftly publishing their business results for 2008 in which their branches in Central and Eastern Europe were presented as the main generators of profit. They also proclaimed that their presence in the region is of the utmost strategic importance and indicated that they had no intention to withdraw from these markets.

The publication of these analyses coincided with a sharp increase in risk perception regarding the countries in the region and banks exposed to that region (Figure 1). To examine whether financial markets share the attitude of agencies, a study was made to discover what affects risk perception of the countries and banks active in the region. For that purpose, a comparison was made of changes in risk perception in terms of CDS spreads (Figures 10 and 11) for Central and Eastern European countries and selected emerging markets from other regions. The same procedure was carried out for banks exposed to the region, whose risk perception was compared with that for a group of banks not exposed to the region.

The correlation of principal components of weekly changes in CDS spreads was empirically assessed. The analysis results show that changes in CDS spreads for countries and banks in the Central and Eastern European region are not specific in any way and that their dynamics is largely determined by global factors (risk appetite in financial markets). CDS spreads for Central and Eastern European countries and emerging markets in Latin America and Asia are strongly correlated, with the principal component accounting, on average, for more than 70% of their variation (Figure 2). The importance of the principal component sharply increased in September 2008 following the failure of Lehman Brothers when global financial market risk-aversion reached its peak. Afterwards, it drifted lower towards its pre-crisis level as financial markets began to differentiate credit risk depending on the financial crisis impact on macroeconomic developments in individual countries (negative economic growth, currency depreciation and fiscal problems).

For most countries in the region, CDS spreads were significantly correlated with the principal component. Slovenia represents the most obvious deviation from this pattern. As a eurozone member, financial markets see it less risky, which is reflected in the lowest CDS spread of all observed countries. As their macroeconomic problems are particularly

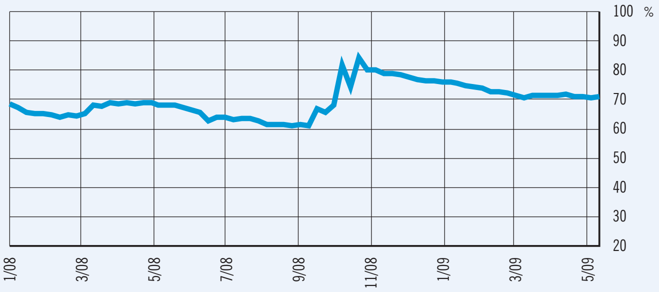
Figure 1 Share of a Banking Group's Assets Related to its Branches in Central and Eastern Europe



Note: The figure shows indirect exposure to Central and Eastern Europe of Bayerische Landesbank and Bank Austria AG through Hypo Alpe-Adria Bank International AG and Unicredit S.p.A. respectively.

Source: Bankscope.

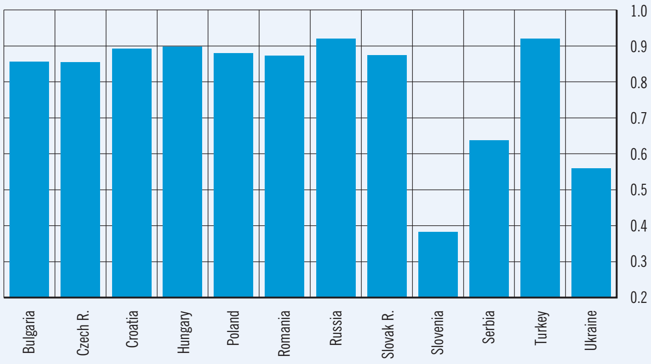
Figure 2 Percentage of the Variation in CDS Spreads for Emerging Market Countries Explained by the Principal Component



Note: The principal component analysis was applied to 12 Central and Eastern European countries (Bulgaria, the Czech R., Croatia, Hungary, Poland, Romania, Russia, the Slovak R., Slovenia, Serbia, Turkey and Ukraine) and 12 Latin American and Asian countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru, Philippines, Indonesia, China, Malaysia, Thailand and Vietnam).

Sources: Bloomberg and CNB.

Figure 3 Correlation with the Principal Component for Countries



Note: Correlations for Latin American and Asian countries are not presented.

Sources: Bloomberg and CNB.

---

[1] Moody's, *West European ownership of East European banks during financial and macroeconomic stress*, February 2009; Fitch Ratings, *Major Western European Banks' Exposure to Eastern Europe and the CIS*, April 2009.

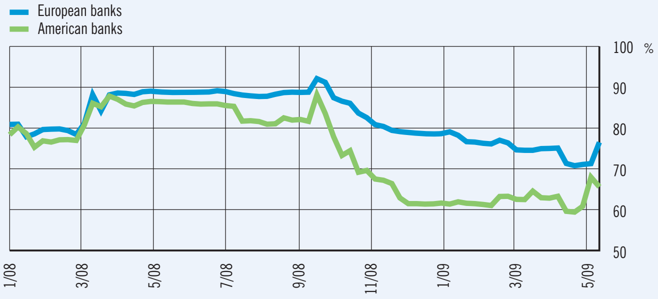
severe, a high idiosyncratic component is also present in movements of CDS spreads for Ukraine and, to some extent, Serbia (Figure 3).

A strong principal component is also present in movements of CDS spreads for parent banks of Croatian banks and the largest world banks not exposed to the Central and Eastern European region. The similarities with European banks are greater than with American banks. The variation maximum explained by the principal component was also recorded in the month of the Lehman Brothers failure when CDS spreads for all banks took a sudden hike. However, as the market soon began again to differentiate the riskiness of individual banks, the share of the principal component in accounting for CDS spreads gradually decreased below the level prior to the financial crisis escalation (Figure 4).

CDS spreads for parent banks of Croatian banks are highly correlated with the principal component regardless of whether their exposure to the region is negligible or substantial. A significant idiosyncratic component was observed only for Bayerische Landesbank whose CDS spreads were exceptionally stable for the most part (Figure 5).

Although some analyses[2] show an above-average "distress dependence" of changes in CDS spreads for Central and Eastern European countries, which is correlated with changes in CDS spreads for banks with significant exposure to that region, this is not confirmed by the present analysis. It became evident that a sharp increase in CDS spreads for countries in the region in September 2008 and March 2009 and their recent noticeable decrease are not dissimilar to the dynamics of CDS spreads for comparable countries in other regions. Hence, it seems that financial markets did not treat the Central and Eastern European region as a separate case, particularly exposed to the financial crisis, but were mostly led by global factors in estimating the region's credit risk.

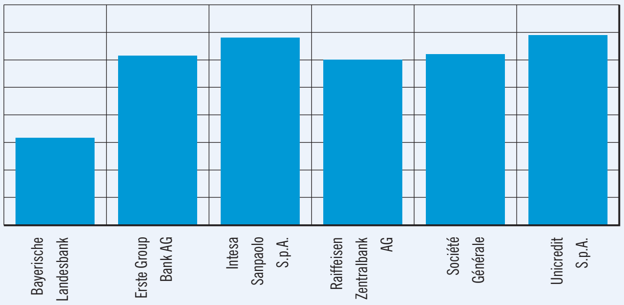
Figure 4 Percentage of the Variation in CDS Spreads for Parent Banks of Croatian Banks and the Largest European and American Banks Explained by the Principal Component



Note: The principal component analysis was applied to four parent banks of Croatian banks (Erste Group Bank AG, Intesa Sanpaolo S.p.A., Société Générale and Unicredit S.p.A.), the four largest European banks (Credit Suisse, HSBC, HBOS and the Royal Bank of Scotland) and the four largest American banks (Bank of America, JP Morgan, Wachovia and Wells Fargo). Bayerische Landesbank and RZB AG were not included in the analysis due to the lack of data for previous periods.

Sources: Bloomberg and CNB.

Figure 5 Correlation with the Principal Component for the Banks



Note: Correlations for the largest European and American banks are not presented. The figure shows the arithmetic mean of the largest European and American banks' correlations with the principal component of weekly changes in CDS spreads in the period between 27 June 2008 and 15 May 2009 for which data on CDS spreads for Bayerische Landesbank and RZB AG are available.

Sources: Bloomberg and CNB.

---

[2] IMF, *Global Financial Stability Report* (April 2009), Annex 1.3.

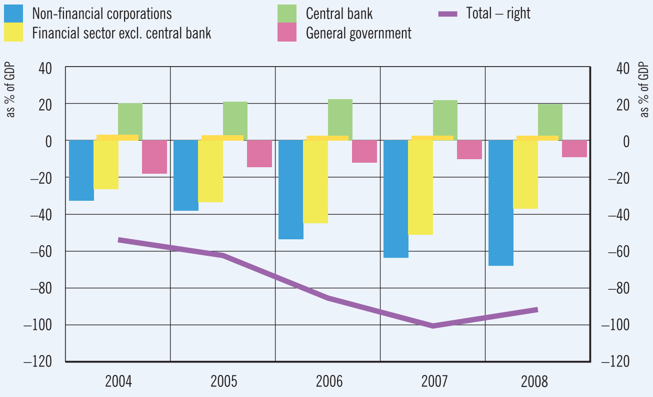
Box 3 Preliminary Financial Accounts for Croatia

Financial accounts describe financial relations among institutional sectors of the domestic economy and their relations with the rest of the world. By presenting total inter-sector claims and liabilities of particular sectors and their net financial position, which indicates the sectors that are sources of financial surpluses and the sectors that are sources of financial deficits, financial accounts also provide an insight into financial instruments used in inter-sector financial transactions as well as their currency and maturity breakdown. These constitute key information needed to make an economic analysis for the purposes of economic and business policy makers, for both the public and private sectors. The text below presents the several-year dynamics of certain aspects of inter-sector financial relations that are particularly interesting for the analysis of financial system stability.

It should be particularly noted that these are the first preliminary results of experimental work on financial accounts compilation for the Republic of Croatia and that they still contain a number of open methodological issues. Although they are here presented only as a rough illustration of inter-sector relations, they can be useful in the detection of the main trends.

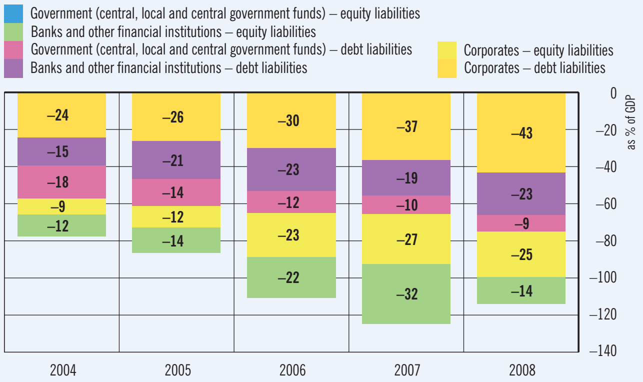
The overall net financial position vis-á-vis the rest of the world improved in 2008 largely due to a fall in banking sector's equity liabilities to non-residents, which was caused by a plunge in the market value of shares of domestic banks. Equity liabilities of the non-financial corporate sector vis-á-vis the rest of the world followed the same trend, while their debt liabilities continued to grow due to new foreign borrowings (Figures 1 and 2).

Figure 1 Net Financial Position of Domestic Sectors with respect to the Rest of the World



Source: CNB.

Figure 2 Net Financial Position of Selected Domestic Sectors with respect to the Rest of the World by Equity and Debt Instrument



Source: CNB.

Table 1 Inter-Sector Claims and Liabilities at end-2007 and end-2008

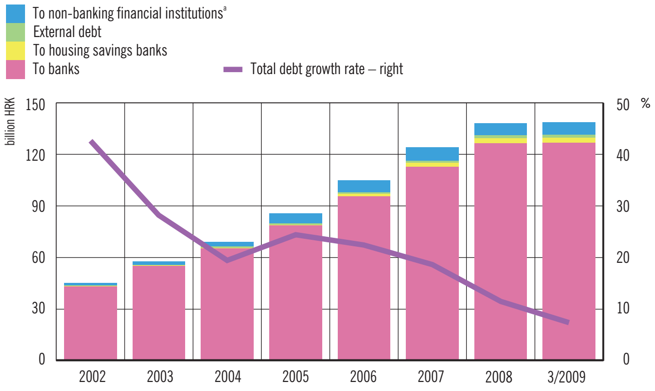
as % of GDP

Liabilities		Claims												Total liabilities	
		Domestic sectors										Rest of the world			
		Corporates		Financial sector		General government		Households		Total					
		2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Corporates	Monetary gold and SDRs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Currency and deposits	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Securities other than shares	0	0	2	2	0	0	0	0	2	2	1	1	3	3
	Loans	0	0	35	38	0	0	0	0	35	38	29	36	64	74
	Shares and equity	51	47	7	6	29	27	25	23	112	104	32	30	145	134
	Insurance technical provisions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other claims and liabilities	34	31	1	1	5	5	2	2	42	39	12	11	54	50
	Total	85	78	45	47	34	32	27	25	191	183	74	78	266	260
Financial sector	Monetary gold and SDRs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Currency and deposits	18	15	22	17	2	2	47	48	89	82	10	11	99	93
	Securities other than shares	0	0	0	0	0	0	0	0	0	0	3	3	3	3
	Loans	0	0	7	6	0	0	0	0	7	6	21	23	28	29
	Shares and equity	3	2	3	2	9	7	8	3	23	14	36	16	60	30
	Insurance technical provisions	1	1	1	1	0	0	11	11	13	13	0	0	13	13
	Other claims and liabilities	1	1	1	1	0	0	1	1	4	3	0	1	5	4
	Total	23	19	34	26	11	9	68	64	137	118	71	54	208	172
General government	Monetary gold and SDRs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Currency and deposits	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Securities other than shares	0	0	16	16	0	0	0	0	16	16	6	6	23	21
	Loans	0	0	5	6	0	0	0	0	5	6	3	3	8	9
	Shares and equity	0	0	0	0	39	29	0	0	39	29	0	0	39	29
	Insurance technical provisions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other claims and liabilities	4	3	0	0	0	0	2	2	6	6	0	0	6	6
	Total	4	3	22	22	39	29	2	2	67	56	10	9	77	65
Households	Monetary gold and SDRs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Currency and deposits	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Securities other than shares	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Loans	0	0	38	39	0	0	0	0	38	39	1	1	39	39
	Shares and equity	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Insurance technical provisions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other claims and liabilities	0	0	1	1	0	0	0	0	1	1	0	0	1	1
	Total	0	0	39	40	0	0	0	0	39	40	1	1	39	41
Rest of the world	Monetary gold and SDRs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Currency and deposits	0	0	22	15	0	0	3	3	25	18	0	0	25	18
	Securities other than shares	0	0	15	19	0	0	0	0	15	19	0	0	15	19
	Loans	0	0	1	1	0	0	0	0	1	1	0	0	1	1
	Shares and equity	5	5	4	1	0	0	0	0	9	6	0	0	9	6
	Insurance technical provisions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other claims and liabilities	5	5	0	0	0	0	0	0	5	5	0	0	5	5
	Total	11	10	41	37	0	0	3	3	55	50	0	0	55	50
Total	Monetary gold and SDRs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Currency and deposits	18	15	44	32	2	2	50	51	114	100	10	11	124	111
	Securities other than shares	0	0	33	37	0	0	0	0	33	37	10	9	43	47
	Loans	0	0	86	89	0	0	0	0	86	89	54	63	140	152
	Shares and equity	59	54	14	9	77	63	34	27	184	153	68	45	253	199
	Insurance technical provisions	1	1	1	1	0	0	11	11	13	13	0	0	13	13
	Other claims and liabilities	44	41	3	3	5	5	6	6	58	54	13	12	71	66
	Total	123	111	181	171	84	70	101	94	489	447	155	141	644	588

Source: CNB.

Household Sector

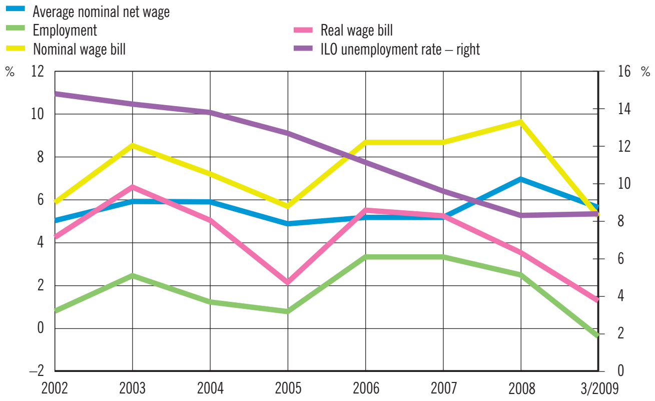
Figure 24 Household Debt



[a] Data on household debt to leasing companies, insurance companies and savings and loan associations are based on estimates.

Sources: CNB and HANFA.

Figure 25 Annual Change in Unemployment, Employment and Wages



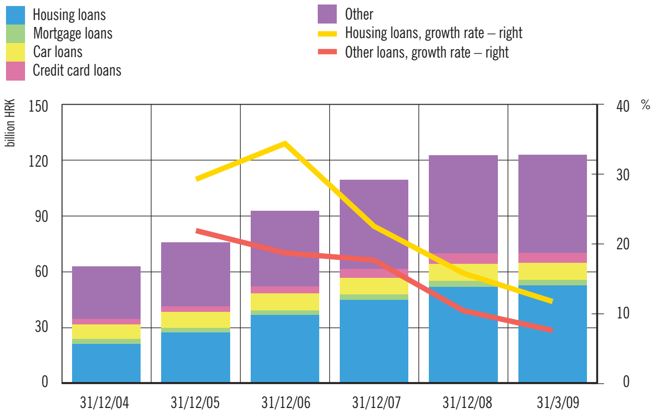
Source: CBS.

The slowdown in household debt growth put a stop to the increase in the household debt level in late 2008 and early 2009 although some debt and debt burden indicators continued to grow mildly. At the same time, the currency and interest rate exposure of households increased further. Although the household debt level and debt burden should stabilise in the rest of the year, unfavourable labour market trends could erode some households' capacity to service their credit obligations regularly.

Household debt growth, which sharply decelerated in late 2008, came to a standstill early in 2009 (Figure 24). The annual growth rate of household debt, which stayed relatively high in 2008 due to the base effect of its mid-year increase, dropped to 7.3% in March 2009, a quarter less than at end-2008. The interruption of household loan growth was due to several supply side factors – primarily the banks' desire (at the time when liquidity conditions are tight and foreign assets are used to finance domestic lending) to maintain established relationships with corporates and particularly to provide funds to the government, as a more reliable borrower in the period of economic downturn. Household loan demand itself dropped due to increased insecurity regarding the future dynamics of employment and wages, which recorded negative trends early in 2009 (Figure 25), pessimism regarding future developments in the residential property market, which induced some households to postpone a decision to purchase a dwelling, and the recently emerging risks resulting from the upward tendency of interest rates.

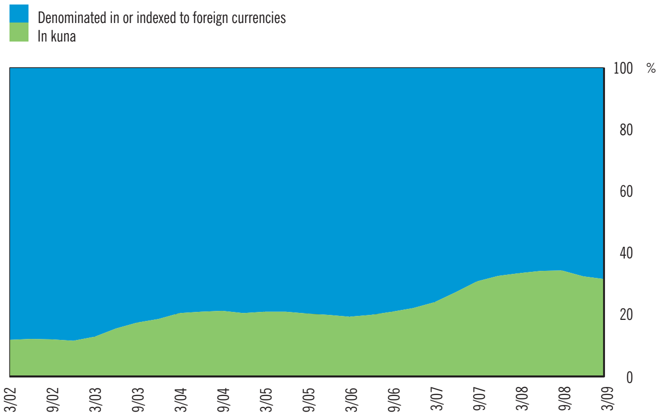
In such circumstances, banks and housing savings banks, which account for the bulk of household debt, significantly slowed down lending to households. The growth of all types of bank loans slackened; credit card and car loans, which grew slower

Figure 26 Household Loans by Purpose



Source: CNB.

Figure 27 Currency Breakdown of Household Loans



Source: CNB.

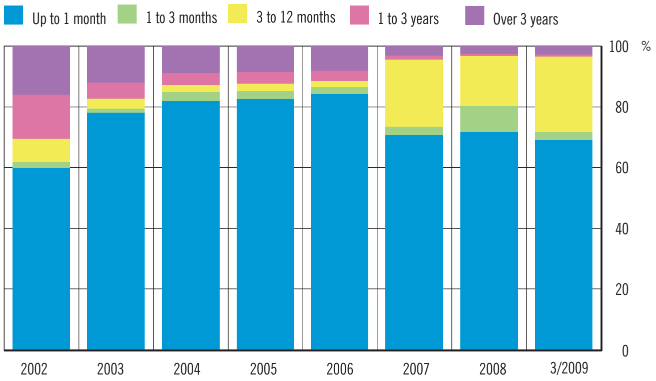
even in the preceding period, decreased in the first quarter of 2009, while housing loans continued to grow at a slower pace (Figure 26).

In the last quarter of 2008, banks relied more heavily on external foreign currency funding and redirected household savings in kuna to foreign currency deposits, which reversed the upward trend in the share of kuna loans in total loans. However, slower lending to households early in the year also slowed down the substitution of kuna loans for loans denominated in or indexed to foreign currencies. In March 2009, 68.3% of total household loans were denominated in foreign currencies, which is still less than in the previous years (Figure 27).

In 2008, as most household loans were issued at variable interest rates, banks continued to transfer the risk of growing domestic and external funding costs to their clients. At end-March 2009, nearly 97% of total household loans were issued at interest rates variable within a year, which shows that the interest rate risk exposure of the household sector is significant (Figure 28). In terms of maturity, most household loans are long-term (Figure 29). However, since most of these loans are also indexed to foreign currencies and contracted at variable interest rates, the currency and interest rate risk exposure of households stayed rather high in 2008 and with a tendency to increase.

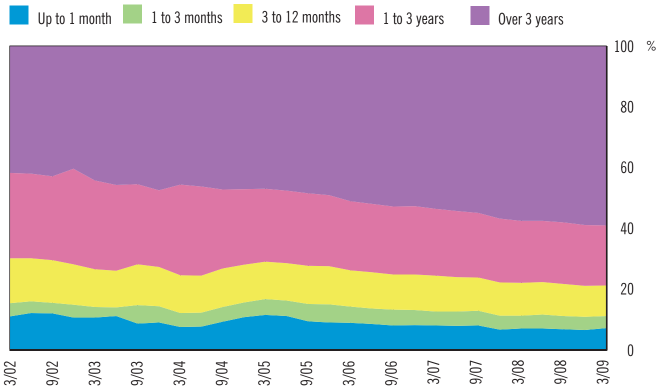
The slower growth in total household debt in 2008 largely stopped the deterioration of household debt and debt burden indicators, which was particularly evident in the first quarter of 2009 (Figure 30). The ratio of household debt to estimated disposable income, which slightly worsened in 2008, improved early in 2009 despite lower growth in household disposable income. The household debt-to-deposit ratio, which was relatively lower than in some Central and Eastern European countries in 2008, also improved slightly at the beginning of 2009 (Figure 31). However, the stagnation of this ratio from early 2008 was

Figure 28 Household Loans by Interest Rate Variability



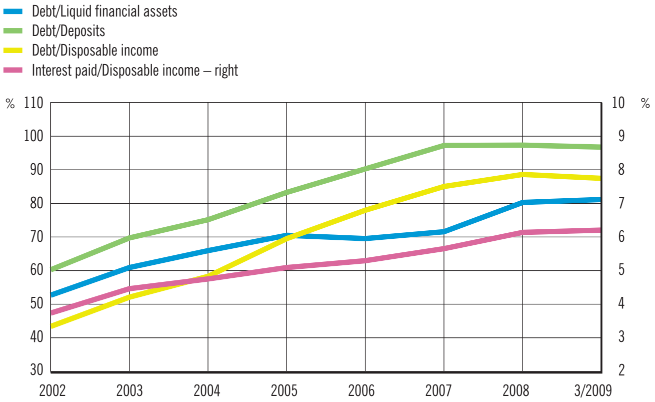
Source: CNB.

Figure 29 Breakdown of Household Loans by Remaining Maturity



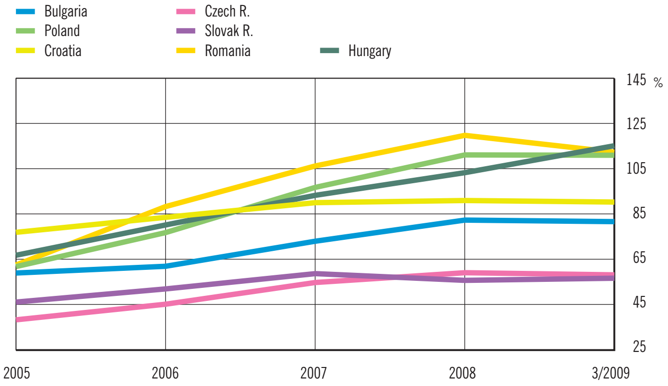
Source: CNB.

Figure 30 Household Debt and Debt Burden



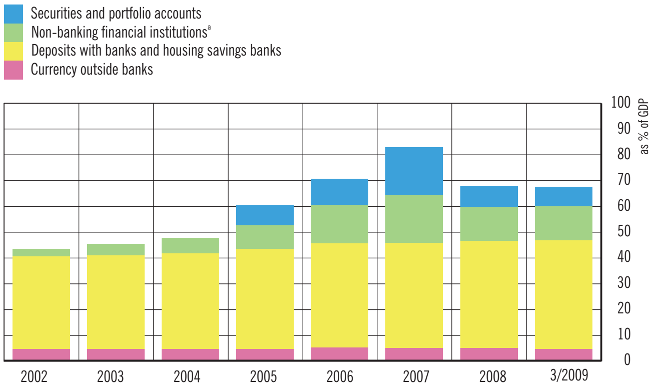
Sources: CNB, HANFA and CDA.

Figure 31 Household Loan-to-Deposit Ratio in Selected Central and Eastern European Countries



Sources: CNB and central banks of the countries observed (BNB, NBR, NBP, CNB, NBS and MNB).

Figure 32 Household Financial Assets



[a] Data on household claims against open-end and closed-end investment funds are based on estimates.

Sources: CNB, HANFA and CDA.

somewhat affected by the transfer of household assets from the capital market to bank deposits, which resulted in a continued deterioration of the ratio of household debt to total liquid financial assets.[1] The mild recovery of the domestic capital market in early 2009 and the stagnant household debt slowed down this indicator's deterioration in the first quarter of 2009. Interest burden, which in recent years grew slower than other indicators, considerably increased due to the upward trend in interest rates that prevailed in 2008 and the first quarter of 2009.

Household loans could slightly grow towards the year-end, while their current distribution is likely to stay unchanged, i.e. housing loans will account for the bulk of newly extended loans. In this way, the banks diversify the risk associated with loans granted to corporates dealing in construction and real estate management. On the other hand, since persistent negative trends in the domestic labour market will decelerate the rise in household disposable income, household debt stagnation is expected to continue. Furthermore, as the pace of interest rate growth is likely to slow down, interest burden should not continue to worsen. Nevertheless, despite the expected stagnation of the debt and debt burden, macroeconomic shocks could hit individual households hard and erode their capacity to meet loan repayments on time (Box 4).

---

1 Household financial assets exclude foreign cash and deposits with foreign banks since their level cannot be precisely estimated.

Box 4 In Search for Subprime Loans to Households

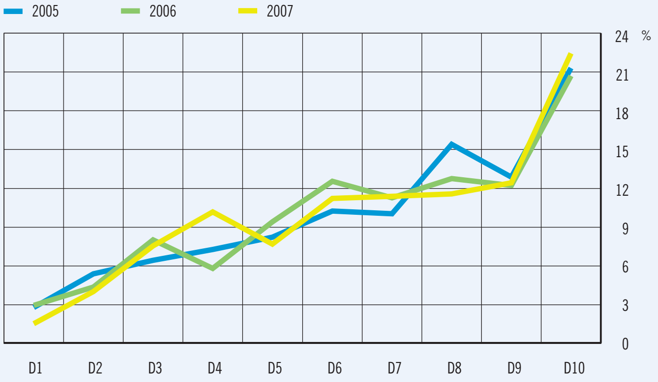
The robust growth in household debt in the 2002-2007 period coincided with real growth in household disposable income, large economic expansion and a considerable fall in banks' interest rates. However, household debt indicators deteriorated markedly as total household debt grew faster than income. This raised concerns about potential implications of an additional increase in the debt burden on financial stability. An analysis of household debt based exclusively on data aggregated at the sector level is not a best financial vulnerability indicator as it fails to provide insight into the distribution of debt and credit risk by individual household groups. Hence, the macro approach must be complemented by using individual data on indebted households to determine the debt structure and sustainability (micro approach).

The analysis of household debt was thus made based on the data from the Household Budget Survey[1] (HBS) for the 2005-2007 period.[2] It established a relative ability of individual household groups regularly to meet their loan obligations and the related credit risk to which the banking sector is exposed. The total number of households included in the survey was divided according to disposable income per household member into ten groups equal in number. In each group, only indebted households were analysed. Also determined were indebtedness distributions according to age and level of education of the household head.

As expected, the analysis of HBS data showed that the share of indebted households in the total number of households by decile increases together with the rise in disposable income. Hence, nearly half of total debt in all reference years was generated by 30% of households with the highest disposable income. Although the percentage of indebted households in the lowest income groups is relatively small, relative indicators show that their debt and loan repayment burdens are significant. However, this does not represent a significant risk for banks as the share of these households in total sector debt is relatively small. Relative indicators of household debt decrease as disposable income increases.

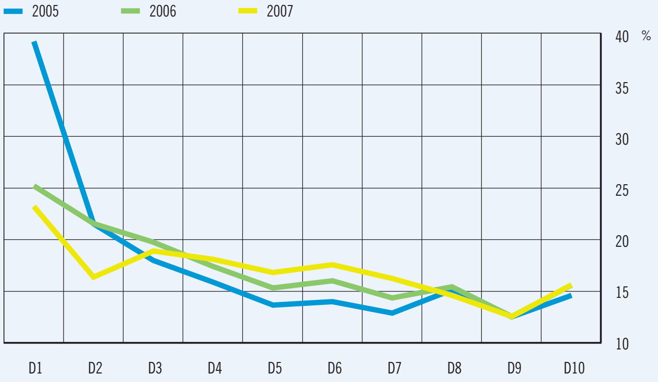
The ultimate goal of the analysis was to identify potential vulnerability sources that could turn into banking sector losses in case of shocks. Potentially vulnerable households were defined by using the concept of financial margin. The financial margin (FMi) is the income reserve available to a household after subtracting from annual household disposable income (HDIi) the at-risk-of-poverty threshold (RPTi) for a household with a certain number of members[3] and the amount of annual loan payments (LPi). A negative financial margin shows that a household with its existing disposable income has difficulties in servicing its debt, and probability of default (pdi) for this household equals 1. Households with

Figure 1 Share of Debt of Households in Individual Income Brackets in Total Sector Debt



Source: Institute of Economics, Zagreb.

Figure 2 Ratio of the Average Loan Payment to Disposable Income per Household Member



Source: Institute of Economics, Zagreb.

$$FM_i = HDI_i - RPT_i - LP_i$$

$$p_i^d \begin{cases} 1 \rightarrow FM_i < 0 \\ 0 \rightarrow FM_i \geq 0 \end{cases}$$

---

[1] The Household Budget Survey is carried out annually by the Croatian Bureau of Statistics and gathers data on individual types of household income, assets and consumption.

[2] Based on the Household Budget Survey, the Institute of Economics, Zagreb carried out an analysis of household indebtedness in 2008 (*Household Credit Risk in Croatia: An Analysis Based on the Household Budget Survey*).

[3] The at-risk-of-poverty threshold is determined for each observed household by multiplying the at-risk-of-poverty threshold for a one-person household, which is published by the CBS for each reference year, by equivalised household size, in which the household head is given the coefficient 1, every other adult aged 15 and over is given the coefficient 0.5, and every child under 15 years of age is given the coefficient 0.3.

a positive income reserve have no financial difficulties and regularly service their loans.

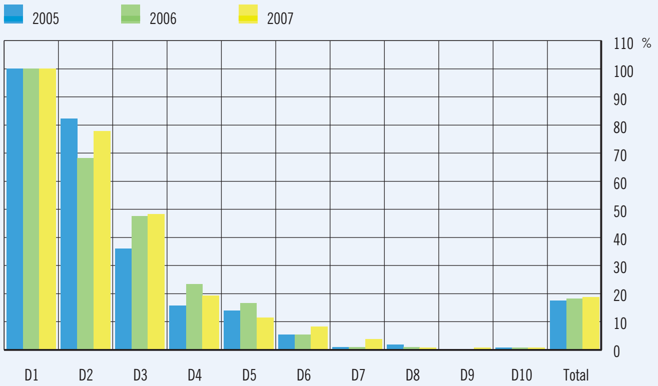
The analysis showed that all indebted households in the lowest income bracket had a negative financial margin in the observed period. However, as these households, on average, account for less than 3% of total sector debt, banks' credit risk exposure arising from these loans gives no reason for concern. The share of vulnerable households in the total number of households decreases as disposable income per household member increases and is less than 1% in the highest income brackets. The total percentage of vulnerable households at the sector level held steady at a relatively high level of 18.2% in the reference period.

Total debt held by potentially vulnerable households, which could not be regularly serviced in case of certain macroeconomic shocks, presents a potential loss for the banking sector (exposure at default, EAD).

Figure 4 shows that the greatest exposure at default arises from loans granted to households in the lowest income brackets while, as expected, it decreases with the rise in disposable income. In the three-year period under observation, on average, 15.3% of total household loans were risky according to this criterion. Notwithstanding a slight downward trend in the share of risky loans in total loans, banks' exposure to credit risk stayed relatively high. A combination of criteria of the financial margin and the ratio of loan payment to household disposable income[4] shows that on average 6.9% of indebted households were vulnerable in the 2005-2007 period. At the same time, their debt accounted, on average, for a significant 9.7% of total household debt, with a tendency to fall.[5]

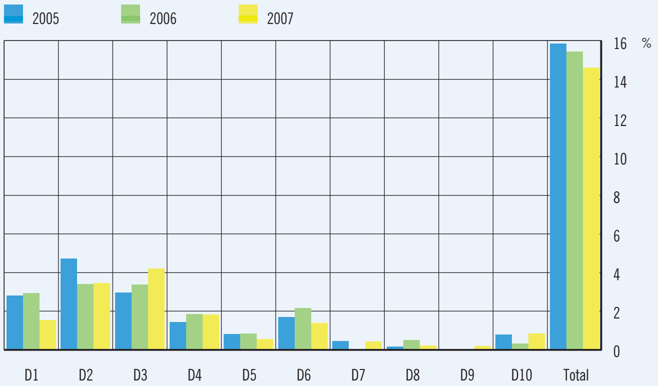
The analysis showed that during the period of rapid credit growth banks pursued prudent credit policies and granted most loans to young educated individuals whose disposable income had good growth prospects. The 2005-2007 growth in total household debt led to a slight increase in the share of vulnerable households in the total number of indebted households. However, the banks' exposure at default associated with loans granted to vulnerable households slightly decreased during the reference period though its level stayed relatively high. Once the household debt data for 2008 become available, a further analysis of household debt based on micro data will be carried out by simulating the impact of various macroeconomic shocks on the households' ability to regularly repay their loans and on potential bank losses.

Figure 3 Share of Households with a Negative Financial Margin in the Total Number of Indebted Households



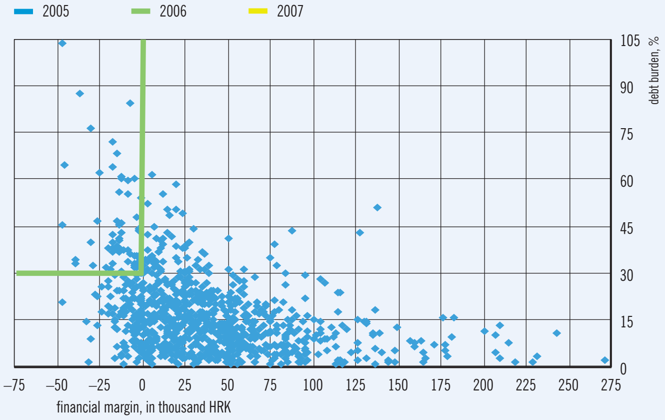
Source: Institute of Economics, Zagreb.

Figure 4 Estimate of Banks' Exposure at Default Based on Loans to Risky Households



Source: Institute of Economics, Zagreb.

Figure 5 Potentially Vulnerable Households in 2007



Source: Institute of Economics, Zagreb.

---

[4] According to the ratio of loan payment to household disposable income, a household is vulnerable if more than 30% of its disposable income goes for loan repayment.

[5] It should be borne in mind that due to relatively low disposable income potentially vulnerable households that were identified may be unable to meet their loan repayments on time, but this does not imply that banks will actually incur losses on all such loans. This is the reason why the banking sector's exposure at default determined in this analysis differs from the amount of non-performing household loans generated by the banks.

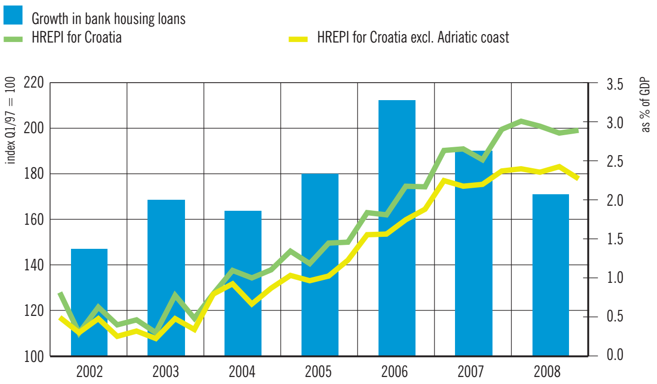
Real Estate Sector

Slower growth in lending to the real estate sector, which was recorded in 2008, has continued in 2009. Increasingly less available and more expensive financing in real terms coupled with expected adverse trends in the labour market will further decrease demand for and market prices of residential property.

The real estate market crisis, which marked the developments in the US and many EU countries as early as 2007, spread to Croatia in 2008. Residential property prices measured in terms of the hedonic real estate price index (HREPI) were on a slight downward path throughout most of 2008. Towards the year-end, they even declined on an annual level (Figure 33). Excluding from the index residential property prices on the Adriatic coast, which grew much sharper in the preceding period than prices in the rest of Croatia and proved to be more resistant to the fall, the annual decline in prices at end-2008 was particularly pronounced.

The fall in residential property prices cannot be accounted for by the 2008 developments in their fundamental factors. Household disposable income went up while real interest rates on housing loans were negative until the very end of 2008. The drop-off in residential property prices hence eliminated their slight overvaluation established since early 2008 (see Box 2 in Financial Stability No. 2). The impact of the global financial turmoil was mostly reflected in the continued slower growth in loans to the real estate sector, particularly in late 2008 and the first three months of 2009. The annual growth rate of total loans to this sector stood at 22.7% at end-2008, 11.1 percentage points less than at end-2007, and dropped to 17.4% at end-March 2009 (Figure 34). The slower growth in total loans was largely due to the slowdown in this sector's foreign borrowing;

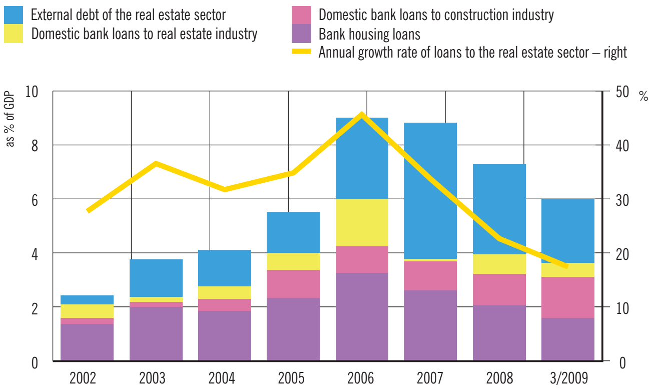
Figure 33 Housing Loans and HREPI[a] on a quarterly basis



[a] The hedonic real estate price index takes into account qualitative characteristics of the real estate.

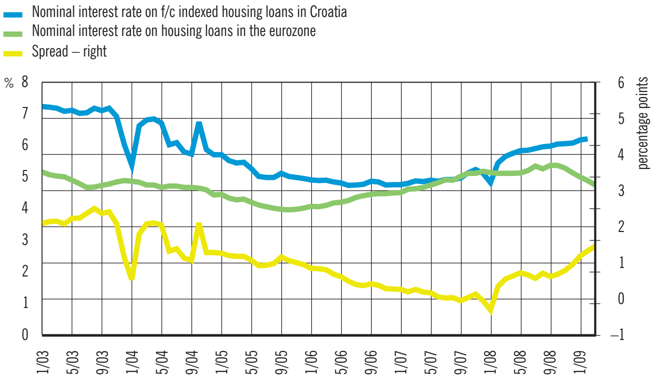
Source: CNB calculations.

Figure 34 Growth in Domestic and Foreign Loans to the Real Estate Sector



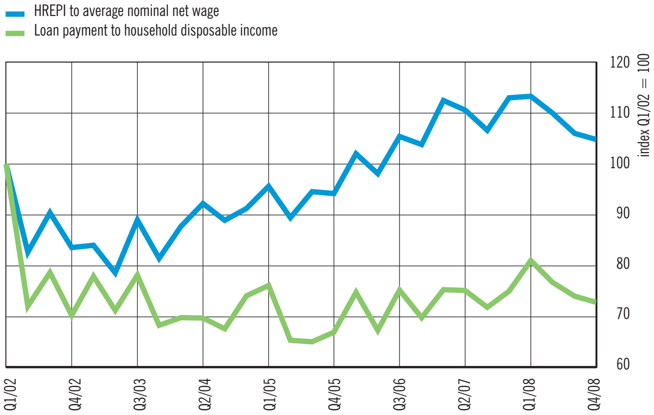
Source: CNB calculations.

Figure 35 Comparison of Interest Rates on Housing Loans in Croatia and the Eurozone



Sources: CNB and ECB.

Figure 36 Financial Availability of Housing Loans



Sources: CBS and CNB calculations.

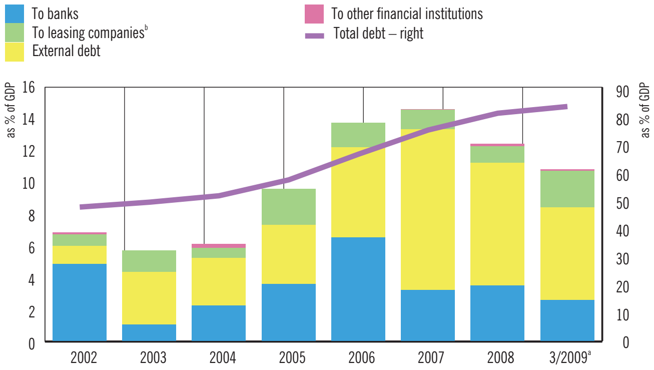
at end-March 2009, its annual growth rate was more than three times as small as at end-2007. In addition, the rise in the domestic debt of the real estate sector also decelerated, largely on account of slower growth in housing loans.

In addition to the steady increase in the average nominal net wage, a mild downward trend in prices of residential property in 2008 considerably improved its financial availability, measured as the ratio of the HREPI to the nominal wage (Figure 36). At the same time, since disposable income of the average household grew more rapidly than the average housing loan payment, the financial availability of residential real estate measured in terms of this ratio also significantly improved.

The impact of the recession, which began in Croatia in mid-2008, on fundamental variables important for the real estate market will be particularly felt in 2009. Adverse labour market developments will lower real household disposable income, while the global easing of inflationary pressures will raise real interest rates on housing loans. In contrast, nominal rates are expected to stay at their current high level, which suggests that equilibrium prices should also fall over 2009. In addition to lower demand for housing loans, this will reinforce downward pressures on market prices of residential property. In turn, lower prices will adversely affect operating income of corporates dealing in construction and real estate activities and their ability to repay existing debt in conditions of relatively high real interest rates.

Non-Financial Corporate Sector

Figure 37 Change and Non-Financial Corporate Debt Stock

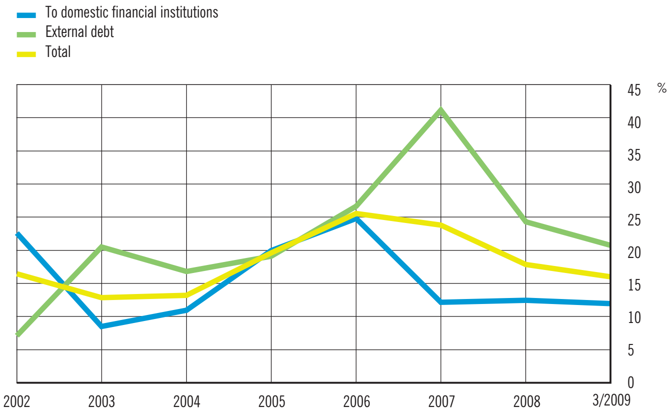


[a] Debt inflows in the first quarter of 2009 are presented as percentage of projected quarterly GDP.

[b] Data on debt to leasing companies are based on estimates.

Sources: CNB and HANFA.

Figure 38 Annual Growth Rate of Non-Financial Corporate Debt



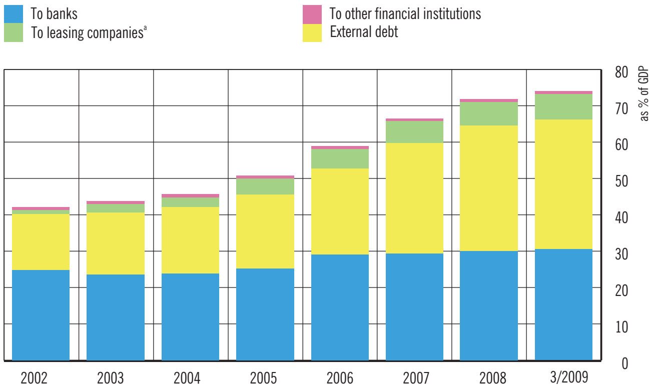
Sources: CNB and HANFA.

The slowdown in non-financial corporate debt growth has become more pronounced due to the lower increase in the external debt of the non-tradable sector, which was the main generator of debt growth in previous years. Deteriorated economic conditions and more expensive funding considerably increased the corporate debt burden. This increased the risk of default as corporate liquidity is at its lowest level in the last decade.

The slowdown in non-financial corporate debt growth, which began in 2007, gained speed in late 2008 and early 2009. This was mostly determined by weaker corporate demand for loans, which was due to a decline in economic activity, as well as less available and more expensive funding sources. These trends were mostly the consequence of slower growth in foreign debt, although it still accounted for more than half of total growth in non-financial corporate debt (Figure 37). As corporates compensated for slower bank lending by raising more loans from leasing companies in late 2008 and early 2009 in particular, the annual growth rate of their domestic debt held steady at its end-2008 level of 12%. Less rapid foreign borrowing lowered the year-on-year growth rate of total corporate debt from 19% in September 2008 to 16% in March 2009 (Figure 38). The ratio of non-financial corporate debt to GDP continued trending up in the first quarter of 2009 somewhat also due to the expected year-on-year decline in nominal GDP in the first quarter of 2009 (Figure 39).

The non-tradable sector, which was the main driver of external debt growth in previous years, has now become the main driver of the debt slowdown. In contrast, external debt of the tradable sector grew more rapidly (Figure 40). The non-tradable sector partly compensated for reduced foreign capital inflows by relying more heavily on domestic market borrowing (Figure 41).

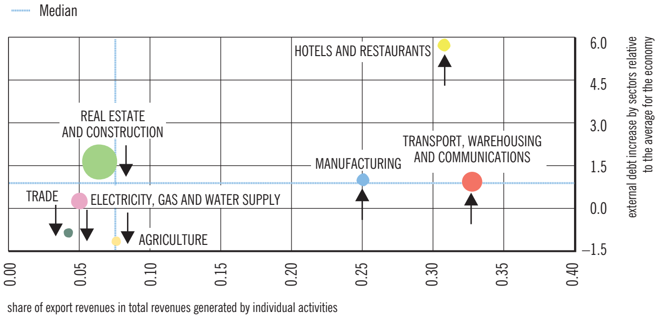
Figure 39 Non-Financial Corporate Debt



[a] Data on debt to leasing companies are based on estimates.

Sources: CNB and HANFA.

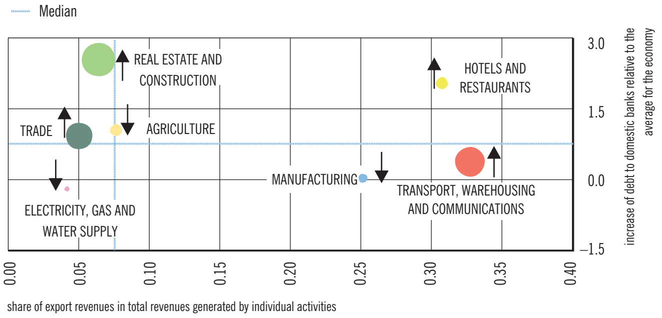
Figure 40 External Debt Allocation by Sectors from September 2008 to March 2009



Note: The size of the circle denotes the significance of a particular activity's share in total external debt of non-financial corporations, with the debt balance at end-March 2009 used as the debt indicator. Arrows pointing up (down) denote an acceleration (decelaration) in external borrowing of an activity relative to the base period.

Sources: CNB (external debt) and FINA (export and total revenues).

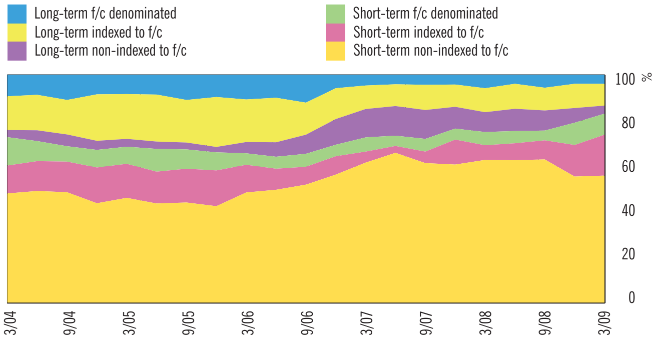
Figure 41 Allocation of Domestic Bank Loans by Sectors from September 2008 to March 2009



Note: The size of the circle denotes the significance of a particular activity's share in total debt of non-financial corporations to domestic banks, with the debt balance at end-March 2009 used as the debt indicator. Arrows pointing up (down) denote an acceleration (decelaration) in domestic borrowing of an activity relative to the base period.

Sources: CNB (external debt) and FINA (export and total revenues).

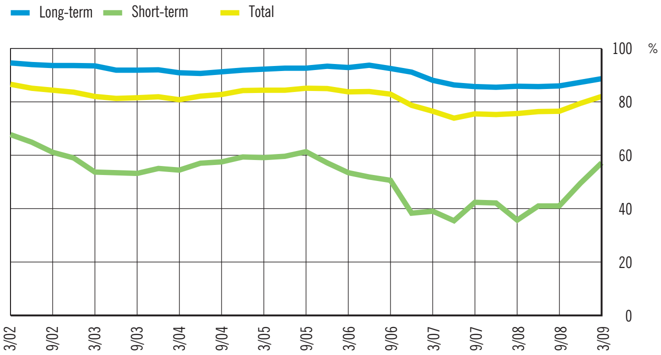
Figure 42 Breakdown of Newly-Granted Bank Loans to Non-Financial Corporations by Maturity and Currency



Note: Short-term loans comprise personal overdrafts, which are statistically recorded as newly-granted loans in each month.

Source: CNB.

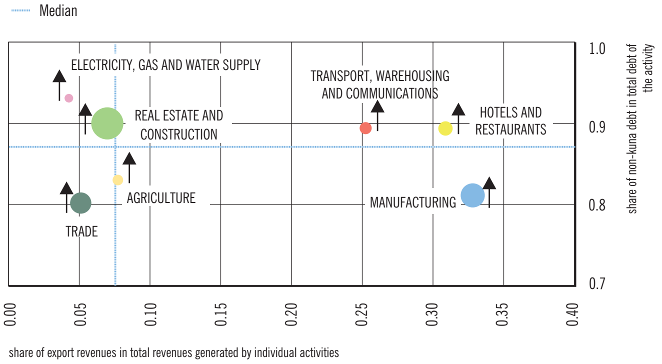
Figure 43 Share of Bank Non-Kuna Loans and Non-Financial Corporate External Debt[a] in Total Loans



[a] It is assumed that total external debt is denominated in foreign currencies.

Source: CNB.

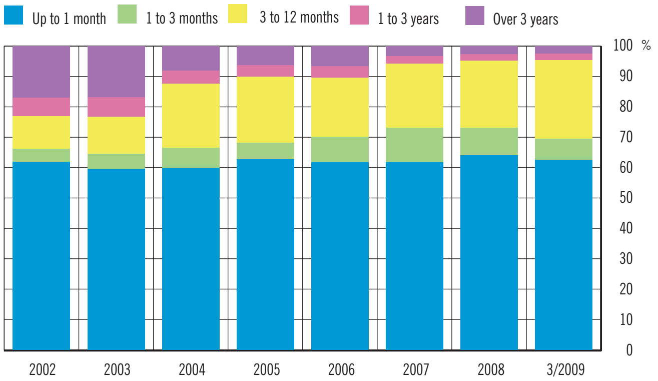
Figure 44 Currency Exposure in March 2009



Note: The size of the circle denotes a particular activity's share in total debt of non-financial corporations. Arrows pointing up denote an increase in currency risk exposure relative to September 2008.

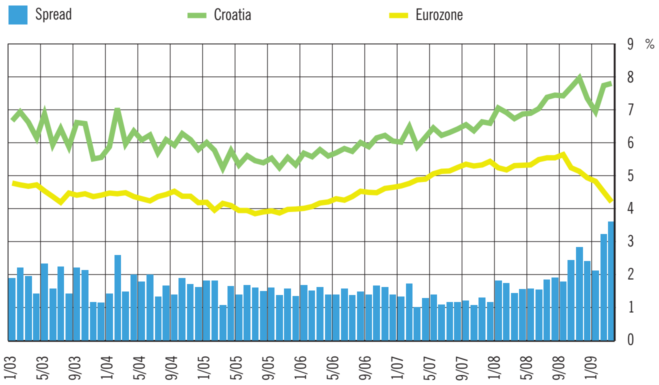
Sources: CNB (loans by activity) and FINA (export and total revenues).

Figure 45 Breakdown of Bank Loans to Non-Financial Corporations by Interest Rate Variability



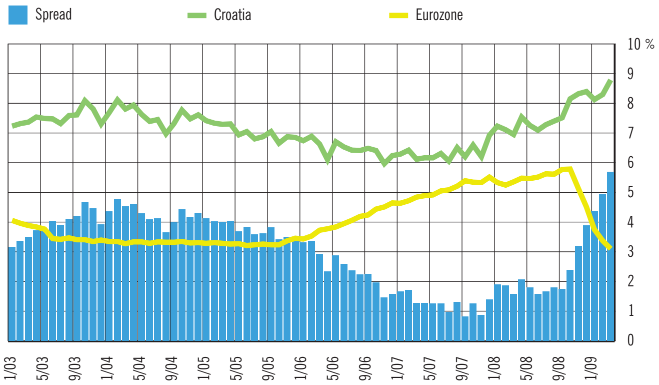
Source: CNB.

Figure 46 Interest Rates on Long-Term Loans to Non-Financial Corporations in Croatia and the Eurozone



Sources: CNB and ECB.

Figure 47 Interest Rates on Short-Term Loans to Non-Financial Corporations in Croatia and the Eurozone



Sources: CNB and ECB.

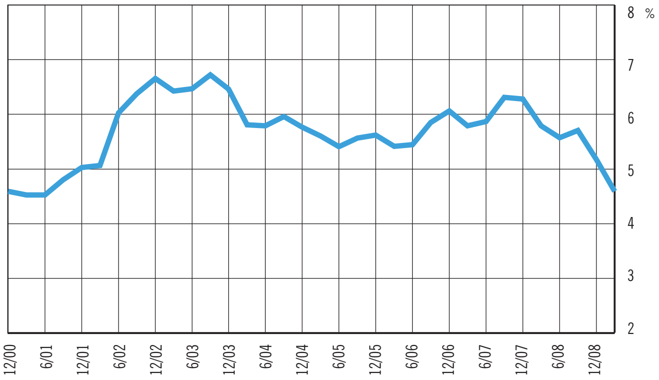
Since corporate demand for investment loans weakened, most bank loans were short-term. Furthermore, the release of foreign currency reserves and relative strengthening of foreign currency sources affected the currency position of banks and induced them to grant more loans with a currency clause (Figure 42). This additionally raised the currency risk of non-financial corporations relative to last year, while the share of foreign-currency denominated debt exceeded 80% of total debt (Figure 43).

Corporates in the non-tradable sector are more exposed to currency risk as most of their loans are foreign currency loans while they do not generate foreign currency income. Hence, exchange rate depreciation would hit them harder and they would face difficulties in loan repayment. Their exposure to currency risk grew additionally relative to September 2008 as the impact of the increase in domestic debt with a currency clause was stronger than the slowdown in foreign borrowing. Currency risk exposure of the tradable sector also increased although corporates in this sector have, to a larger extent, foreign-currency flows matching their foreign-currency liabilities, which makes them less exposed to currency risk (Figure 44).

Notwithstanding a slight increase in the share of loans with longer periods in which interest rates are fixed, the sensitivity of non-financial corporations to interest rate risk remained high. Namely, 70% of domestic bank loans were made with interest rates variable within three months (Figure 45). Interest rate risk was also increased by the fact that most foreign loans were issued at variable interest rates.

The upward trend of corporate loan interest rates in Croatia, which began in early 2006, gained momentum in the last quarter

Figure 48 Ratio of Transaction Account Deposits of Non-Financial Corporations to Gross Value Added



Source: CNB.

of 2008 due to the much higher domestic banks' risk premium in the cost of foreign funding, more expensive domestic sources as well as banks' efforts to raise the interest margin and thus create reserves for potential future losses. At the same time, corporate loan interest rates in the eurozone dropped abruptly in response to the expansive monetary policy of the European Central Bank. The several-year narrowing of the difference between corporate loan interest rates in Croatia and in the eurozone thus came to an end and their spread widened markedly, particularly with regard to short-term loans (Figures 46 and 47). This trend should reverse, as signs of stabilisation of interest rates on domestic corporate loans appeared in the second quarter of 2009.

The corporate interest burden sharply increased due to a combination of more expensive funding sources and economic slowdown. Coupled with slower loan growth, this created pressures on corporate liquid assets, which fell to their lowest level in ten years, thereby increasing the risk of default (Figure 48).

Assuming a gradual economic recovery and revival of private sector credit as well as an end to the steady climb in interest rates, the corporate debt service burden is projected to fall slightly in the remainder of the year.

Notwithstanding still stringent conditions for obtaining new loans abroad, particularly for the non-tradable sector, corporate debt refinancing risk should be reduced due to the expected stabilisation of the international financial markets and a decline in risk aversion.

Box 5 Initial Measurement of Corporate Sector Credit Risk

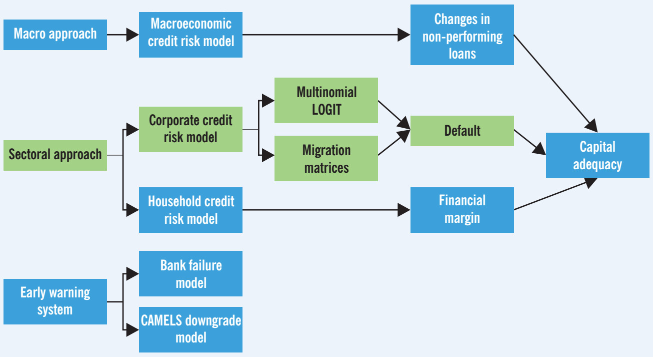
Historically, banking crises have mostly occurred due to the accumulation of non-performing corporate loans. The first signals of loan quality deterioration during the present crisis have also occurred within corporate loans, while the quality of household loans, according to available data, has remained stable. Potential recessionary impacts on the banking sector have up to now been assessed based on a macroeconomic credit risk model, which relies on historical experience of the late 1990s without taking into account changes in the loan portfolio structure and banks' credit risk management. This creates a need for a detailed risk assessment associated with corporate lending. For that purpose, a credit risk model of non-financial companies was estimated, predicting the probability of default[1] of individual business entities in the corporate sector.

Such corporate credit risk models are a standard component of central banks' stress-testing frameworks. They provide an insight into the risk distribution within the banking system, i.e. they allow an estimate be made of the riskiness of each bank and the entire sector due to a deterioration in business performance of firms. In addition to predicting changes in risk distribution, this tool enables the simulation of the impact of various shocks on the quality of corporate loans. Its advantage over a macroeconomic credit risk model lies in its reliance on the most recent data available.[2] Also, as the necessity to assess credit risk of each individual client is embedded in the internal ratings-based approach under the Basel II regulatory framework, the estimation of the credit risk model for the Croatian corporate sector will provide additional information during the validation process of banks' internal models.

Credit Ratings and Definition of Default

The categorisation of risk (ratings) of individual debtors is based on the risk classification of individual banks' exposures (their total placements and off-balance sheet liabilities) to these clients:[3] AX (only performing placements), A90d (fully collateralised placements that are more than 90 days overdue), B (more than 90 days overdue) and C (more than 365 days overdue). A debtor is classified into a specific risk category when the share of the cumulative amount of placements within certain risk categories (from the highest to the lowest) exceeds 50%. This quantitative threshold is determined by the solution to the optimisation problem that maximises the amount of AX placements to AX-rated debtors and of other placements (with a higher degree of risk) to lower-rated debtors (Figure 2).

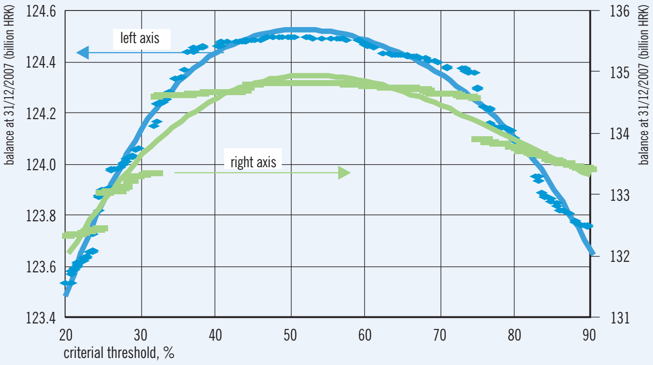
Figure 1 Credit Risk Assessment System in the Croatian National Bank



Note: The parts shaded in green denote the approach analysed in this box.

Source: CNB.

Figure 2 Sum of Accurately Classified Placements (placement rating corresponds to debtor rating) Conditional on the Criterial Threshold



Source: CNB.

Under Basel II provisions, debtors rated A90d, B and C are in default. As expected, a vast majority of debtors regularly serviced their obligations to banks in the period between June 2006 and December 2008.

Although corporates migrate between various ratings, the aggregate structure of debtors' ratings was stable in the reference period: some 8% were in the group of B-rated corporates, 5% had a C rating, while only 2% were rated A90d. The sum of these shares is the average default rate for the Croatian non-financial corporate sector (15%).[4]

---

1 Debtors may continue operating even when they partly or completely fail to meet contractual obligations to creditors, i.e. when they are in default for more than the specified number of days. Another term that could be used is *debtor's failure*. However, it would be inaccurate as the concept of default should be clearly distinguished from the concepts of delinquency, insolvency, bankruptcy and winding up.

2 The model was constructed based on the CNB prudential database on individual banks' exposure and FINA annual financial statements of entrepreneurs.

3 See the Decision on the classification of placements and off-balance sheet liabilities of credit institutions, CNB, January 2009.

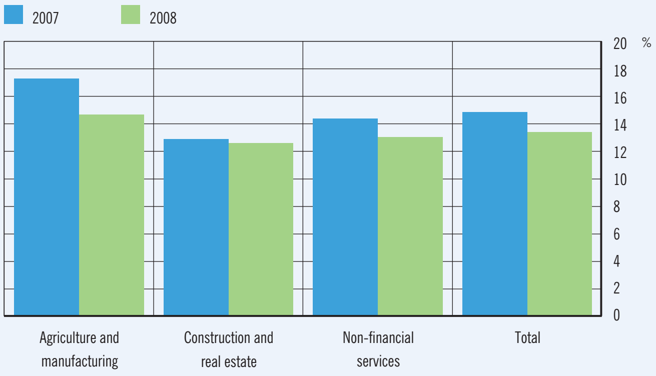
4 Corporate credit risk asymmetrically hits commercial banks; it mostly affects the group of corporate banks through which it spreads most rapidly (see Box 6 Revision of the Stress-Testing Methodology). This explains why this group of banks historically has the highest general default rate.

Table 1 Migration Matrix of the Corporate Sector

Unconditional migration matrix				
Annual frequency				
	AX	A90d	B	C
AX	95.0	2.0	2.7	0.3
A90d	43.0	22.0	32.3	2.6
B	10.1	1.8	81.9	6.1
C	1.7	0.1	1.3	96.9
Quarterly frequency				
	AX	A90d	B	C
AX	97.5	1.5	0.9	0.1
A90d	40.6	43.6	14.9	0.8
B	6.0	0.9	90.8	2.3
C	1.5	0.2	0.8	97.5

Note: Ratings at the beginning of the period are given in rows and ratings at the period end are given in columns.
Source: CNB.

Figure 3 Relative Share of Non-Financial Corporates That Were Overdue for More than 90 Days During Previous Two Years



Source: CNB.

Modelling and Forecasting Probability of Default

Basic information on the migration of debtors from one rating to another, i.e. the probability of default can be derived from migration matrices (Table 1).

Debtors with the highest and lowest ratings (AX and C) migrate the least to other risk categories, which can be explained by the fact that the business environment and financial conditions for these corporates cannot change significantly in the short-run. The ratings of corporates rated A90d and B are more likely to increase than decrease.

Migration matrices have quadratic forms, i.e. for debtors in default there is a probability of a change in their relationship with a bank and a subsequent increase in their rating. An important implication of this phenomenon is that the probability of being in default depends both on the migration from the AX rating to lower ratings and on the migration from ratings A90d, B or C to the AX rating. It is evident that corporates moving from the AX category to lower rating categories migrate to the B rating category the most and to the C category the least. At the same time, the migration to the AX category is most probable for corporates rated A90d, followed by B, while it is least probable for those in the C rating category.

A differentiation of the behaviour of individual corporates relative to the phase of the economic cycle or a particular sector of the economy[5] they operate in provides a better insight into the regularity of observed migrations (conditional matrices). Nothing in the observed sample indicates that either slower economic growth or a particular business sector represents a significantly higher risk to the collection of bank claims. Still, unfavourable macroeconomic trends could adversely affect the quality of banks' portfolios with a certain time lag.

The forecasted probability of default in 2009 based on migration matrices (on an annual and quarterly frequency) stands at around 8% and is somewhat higher than at end-2008, but still does not reflect the impact of the most recent recessionary episode.

The existence of individual business entities in risk categories A90d, B or C[6] (Figure 3) will be explained by applying a multinomial logistic regression based on their own financial indicators.

A number of financial ratios (86 in total) were tested, and were gradually filtered out after their links to the probability of default were checked through univariate regressions and multinomial logistic regressions. The

---

[5] On a sample of 10 observations it was possible to differentiate between an acceleration and retardation phase of the growth cycle (a phase of rapid and slow economic growth): the first lasting from the 3rd quarter of 2006 to the 3rd quarter of 2007 and the second lasting from the 4th quarter of 2007 to the 4th quarter of 2008. Also, non-financial corporates were grouped in three sectors according to the National Classification of Economic Activities (NCEA): Agriculture and manufacturing (NCEA categories A, B, C, D and E), Construction (NCEA categories F and K) and Non-financial services (NCEA categories G, H and I).

[6] This approach is closer to the existing concept of macroeconomic modelling of non-performing loans and capital adequacy (standard stress testing) compared with potential modelling of traditional probability of default.

Table 2 Logistic Regression Results

Independent variable	Coefficient
Constant	–0.17 (0.22)
Construction and real estate dummy	–0.28 (0.07)
Ratio of cash (currency and short-term financial assets) to total assets	–0.63 (0.04)
Ratio of shareholders' equity to total assets	–1.96 (0.19)
Inverse receivables turnover ratio	0.09 (0.01)
Ratio of gross earnings to total liabilities	–0.14 (0.01)
Ratio of total sales plus depreciation to total assets	–0.37 (0.05)
Sales	–0.01 (0.00)
R^2	0.20
Percentage of accurately predicted events of non-default	74.89
Percentage of accurately predicted events of default	71.20
Percentage of total accurately predicted events	74.41

Note: Standard errors are given in brackets.
Source: CNB.

estimated statistical model with the best predictive properties (Table 2) illustrates the main channel of risk transmission from the corporate to the banking sector – probability of default on obligations to banks decreases when the degree of self-financing increases, when the company is more stable and liquid, and when it has a larger market share. In addition, this probability is significantly reduced for corporates in the construction sector. This is not unusual bearing in mind the rapid growth and considerable profits generated in this sector in recent years.

However, to assess the dependent variable sensitivity to changes in independent variables, it is necessary to observe marginal effects. In terms of the quantitative impact on the dependent variable, one debt indicator (ratio of shareholders' equity to total assets) and one profitability indicator (ratio of sales to total assets) are significant.

The presented model successfully (accurately) predicts the probability of default in almost 75% of cases when the marginal value of the estimated probability that separates those that will have no loan repayment difficulties from the rest is 14%. This value corresponds to the default rate on bank loans in the historical sample.

Application of the Credit Risk Assessment System and Future Line of Research

A risk assessment system that would be used to predict the probability of default and measure potential losses due to banks' exposure could be perfected shortly based on previous research and experience in corporate credit risk assessment. It would be used as a complement to the operating early warning system for signaling banks' failures.

This analytical framework could be used to assess independently credit risk models to be implemented by individual banks in the medium term.

Also, both the present model and its possible alternatives that would perfect the system allow for the simulation of macroeconomic shocks and enlargement of the standard stress-testing framework for the banking sector.

After Croatia enters the eurozone, the CNB's internal credit risk assessment system will have to be further developed to evaluate securities acceptable as collateral in open market operations.[7]

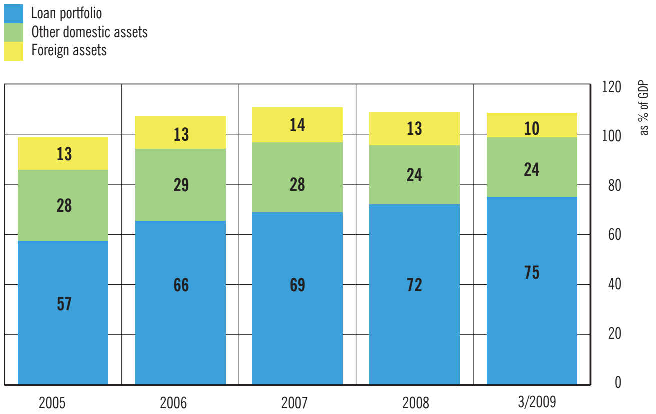
The model could be used in the future to aid the assessment of the impact of monetary measures and other factors on risk distribution in the domestic banking system.

---

[7] The Eurosystem credit assessment framework (ECAF) currently applies internal systems developed by the central banks of Germany, Spain, France and Austria.

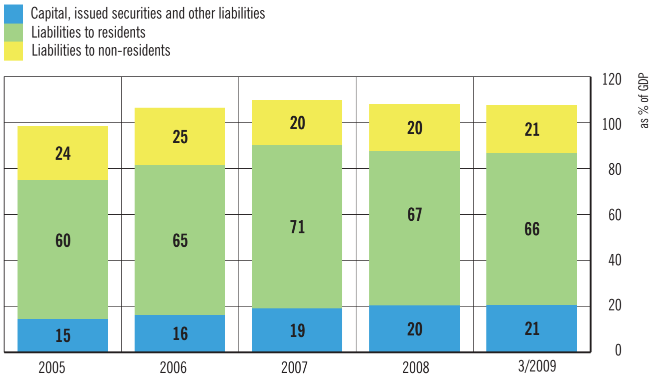
Banking Sector

Figure 49 Banking Sector Assets



Source: CNB.

Figure 50 Banking Sector Liabilities[a]



[a] Collectively assessed impairment provisions represent the difference between banking sector assets and banking sector liabilities and capital.

Source: CNB.

Adverse macroeconomic trends in Croatia stemming from the global financial crisis and recession generated a powerful external shock to the banking sector. In such circumstances, the priority was to maintain confidence in the banking sector, which was much aided by regulatory changes made by the central bank. Effects of the macroeconomic shock on banks' balance sheets are expected to be seen in 2009. Still, stress tests suggest that the banking system will remain stable in the forthcoming period.

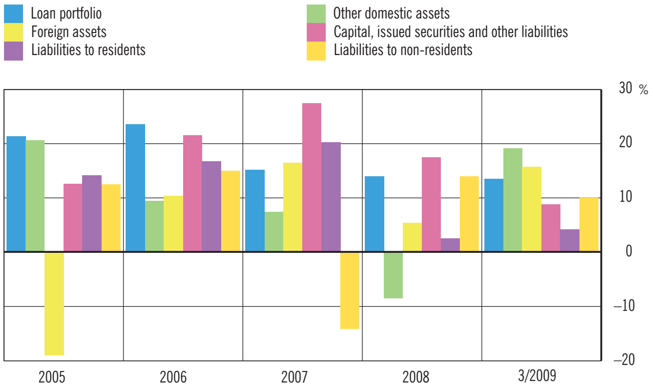
Balance-Sheet Vulnerabilities

Banking sector assets decreased in late 2008 mainly due to the release of the portion of domestic and foreign assets previously immobilised by central bank measures. A decrease in foreign assets related to their liquid component, while a decrease in other domestic assets related to deposits held with the central bank. The withdrawal of these forms of assets enabled banks to continue credit growth, which amounted 14%[2] in 2008 and gained momentum in early 2009 due to intensive lending to

---

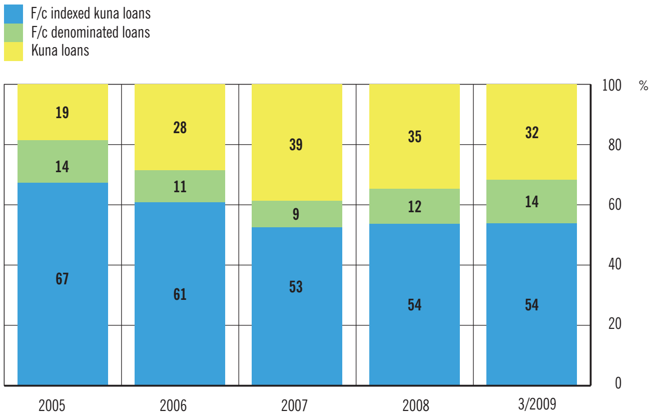
[2] In bank reports, the value of loans and deposits is expressed in kuna, which means that exchange rate changes may decrease or increase non-kuna items. In the period between end-2007 and end-2008, the exchange rate of the kuna against the euro remained unchanged, but the kuna weakened against the Swiss franc by some 11%. In contrast, the kuna weakened against the euro some 2% but held steady against the Swiss franc between end-2008 and the end of the first quarter of 2009. This implies that both credit and deposit growth in 2008 and early 2009 were actually lower than shown by the nominal data.

Figure 51 Annual Growth Rate of Major Banking Sector Balance Sheet Items



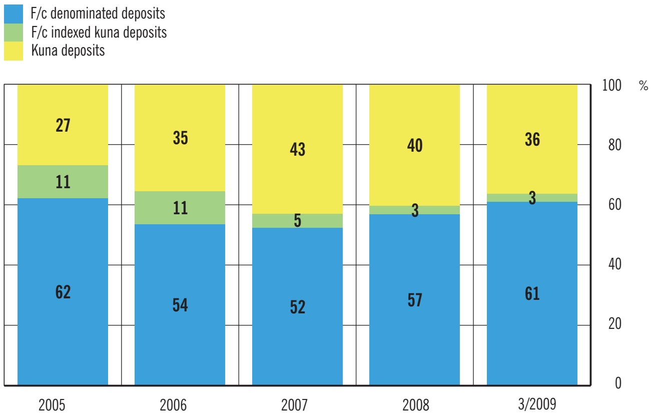
Source: CNB.

Figure 52 Currency Breakdown of Loans



Source: CNB.

Figure 53 Currency Breakdown of Deposits



Source: CNB.

the government, while loans to the private sector effectively decreased. The late 2008 decline in banking sector assets considerably decelerated their annual growth rate as well as their ratio to GDP[3] (to 109%). This ratio held steady in the first quarter of 2009 due to a parallel decline in bank assets and nominal GDP (Figure 49).

As other forms of assets declined in late 2008 and early 2009, banks financed credit growth by relying more strongly on foreign sources, which were reduced in recent years due to regulatory measures of the central bank. At the same time, resident deposits dropped, largely as a result of a major decrease in corporate transaction deposits, while household deposits held steady (Figure 50). Earnings realised in late 2008 and early 2009 continued to enhance banking sector capital (Figure 51).

A strong increase in resident deposits should not be expected in the remainder of the year in the conditions of weak economic activity and slower credit growth, while the effect of the transfer of household assets from the capital market to banks has worn off. In addition, the banks' ability to use remaining foreign reserves has been largely reduced, while it is questionable how many new foreign liabilities they can generate, a practice banks used extensively in late 2008 and early 2009. In addition, capital injections by foreign owners will probably be less abundant in 2009. The increase in funding sources will thus be a strong constraint to loan growth in the remainder of 2009, which means that the loan dynamics could be much slower than in 2008. Still, since the government refinanced its due foreign liabilities abroad, banks will increasingly direct their credit potential to the private sector, particularly the corporate sector[4] in the rest of the year.

Banks granted more foreign currency loans in the last quarter of 2008 and the first quarter of 2009, since they largely relied on foreign currency sources, while some of resident kuna savings were transformed into foreign currency. This reversed the several-year trend of currency restructuring of banks' credit portfolios in favour of kuna loans and the share of kuna loans went down to 35% at end-2008 and to 32% at the end of the first quarter of 2009 (Figure 52). In addition, the government, which usually borrows in kuna, strongly increased its foreign currency borrowing from the banks in late 2008 and early 2009.

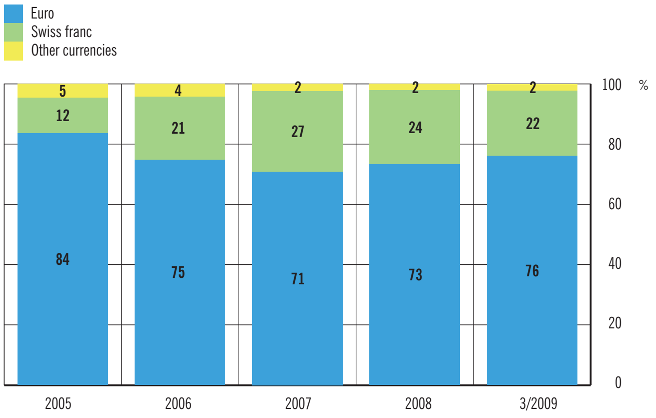
Under the impact of heightened uncertainty, the share of foreign currency deposits will likely continue to grow in the forthcoming period due to a relatively faster increase in household

---

[3] In early 2009, the CBS adjusted the GDP calculation with the international statistical standard ESA 95, which changed the presented ratios compared with those in the last edition of *Financial Stability*. GDP for the first quarter of 2009 is the sum of GDP in the last three quarters of 2008 and estimate for the first quarter of 2009.

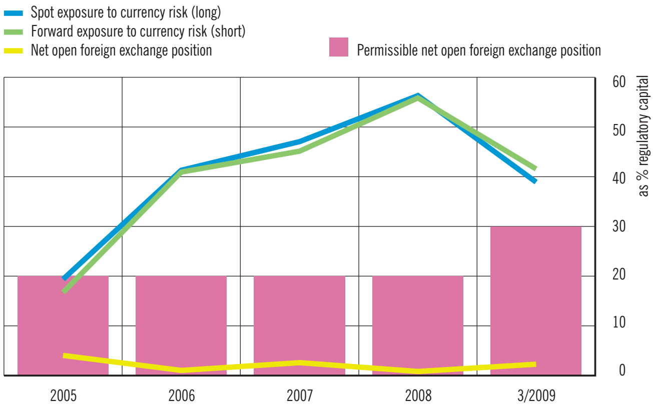
[4] Loans to government units grew by some 50% in 2008 and by an additional 42% in the first quarter of 2009.

Figure 54 Currency Breakdown of Non-Kuna Loans



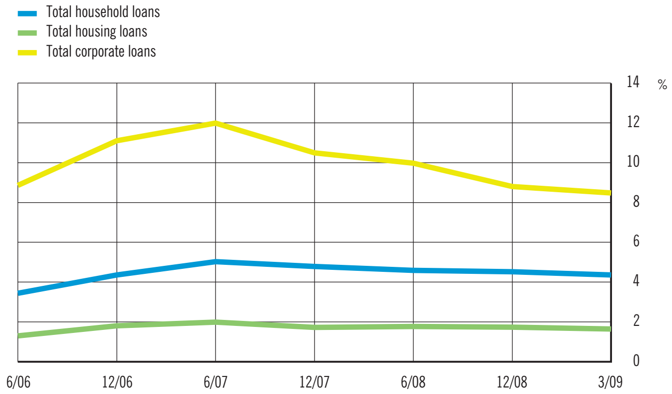
Source: CNB.

Figure 55 Bank Exposure to Currency Risk



Source: CNB.

Figure 56 Share of Hedged Loans in Total Loans Exposed to CICR



Source: CNB.

foreign currency savings, while the share of corporate kuna deposits will probably continue to fall in the period of adverse economic conditions (Figure 53).

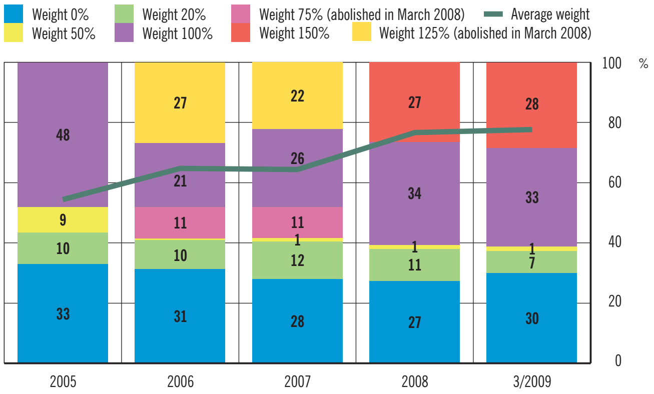
The share of loans indexed to the Swiss franc continued to decline. From the banks' perspective, these loans hinder the management of the foreign exchange position. Lacking sources of Swiss francs in the form of deposits, banks have to reduce their long positions, which arise from the extension of Swiss franc-denominated loans, in the forward market. The share of loans indexed to the Swiss franc is expected to further decline. Demand for these loans also fell due to the strong volatility of both interest rates on the Swiss franc and the kuna/Swiss franc exchange rate (Figure 54).

Surplus foreign exchange liquid assets arising from changes in central bank measures, which aimed at releasing the banks' liquidity, led to changes in banks' foreign exchange positions. As banks began to sell liquid foreign assets and use them as the funding source, their traditionally long spot foreign exchange positions were reduced. In consequence, banks also reduced their forward short foreign exchange positions. Hence their net open foreign exchange positions remained low and much below the limit, which was raised to 30% of regulatory capital to alleviate pressures on the foreign exchange market arising from regulatory changes (Figure 55).

Currency-induced credit risk (CICR) of banks increased in late 2008 and early 2009 mostly due to corporates in the non-tradable sector, which are less protected against currency risk. Through to 2008 these corporates borrowed directly abroad. However, after the escalation of the financial crisis, they mostly shifted to domestic market borrowing (Figure 56).

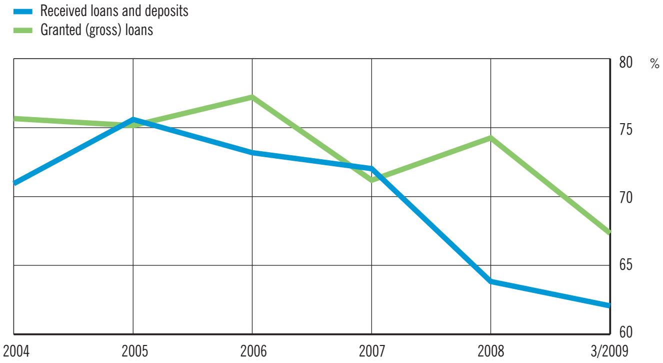
The average weight applicable to bank assets increased in 2008 due to regulatory changes that additionally raised the weights applicable to assets exposed to CICR. Notwithstanding the stagnation in lending to the private sector and the rise in loans

Figure 57 Distribution of Bank Assets by Assigned Weight and the Average Weight



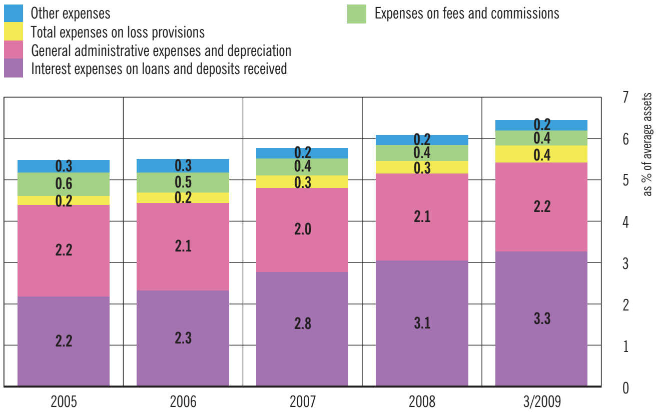
Source: CNB.

Figure 58 Share of (Gross) Loans and Liabilities of Banks with Interest Rate Variable within Three Months in Total Gross Loans and Liabilities of Banks



Source: CNB.

Figure 59 Structure of Total Expenses



Source: CNB.

to the government to which a 0% weight is applied, the average weight grew slightly in the first quarter of 2009 due to a fall in foreign claims to which a 20% weight is applied (Figure 57).

In addition to credit risk, which grows at a time of recessionary tendencies, and currency-induced credit risk stemming from lower foreign capital inflows, the systemically important credit risk is further induced through interest rate risk, which banks transfer to their clients by granting most loans with variable interest rates. Hence, the share of loans with interest rates variable within three months is larger than the share of bank liabilities with interest rates variable in the same period (Figure 58).

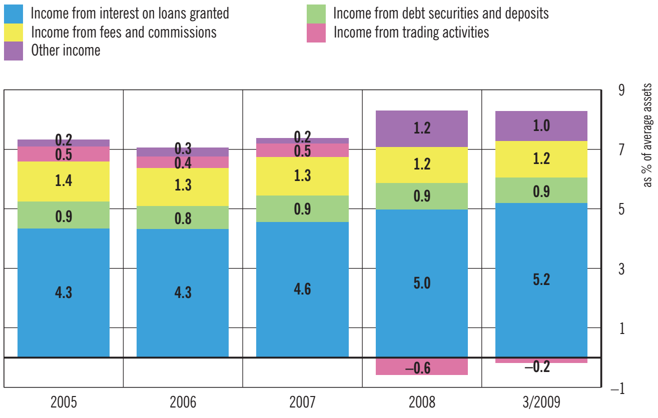
Strategic Risks[5]

The financial crisis affected both lending activities of banks and the currency structure and price of their sources. The rise in the risk premium for Croatia raised banks' foreign funding costs in late 2008 despite the drop in benchmark eurozone interest rates. At the same time, due to the increase in deposit rates aimed at attracting resident deposits, banks were faced with more expensive domestic sources so that the share of interest expenses in average assets continued to increase (Figure 59).

---

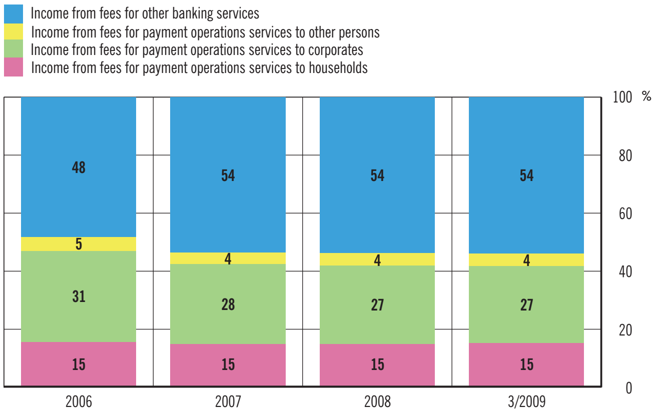
[5] Income statement items for the first quarter of 2009 were annualised to be comparable with those for preceding whole year periods. This was made by summing up banks' business results in the last three quarters of 2008 and the first quarter of 2009.

Figure 60 Structure of Total Income



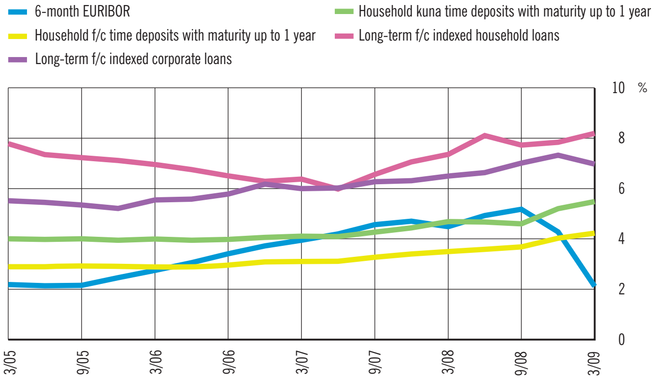
Source: CNB.

Figure 61 Structure of Income from Fees and Commissions



Source: CNB.

Figure 62 Selected Interest Rates (quarterly average of monthly interest rates)



Source: CNB.

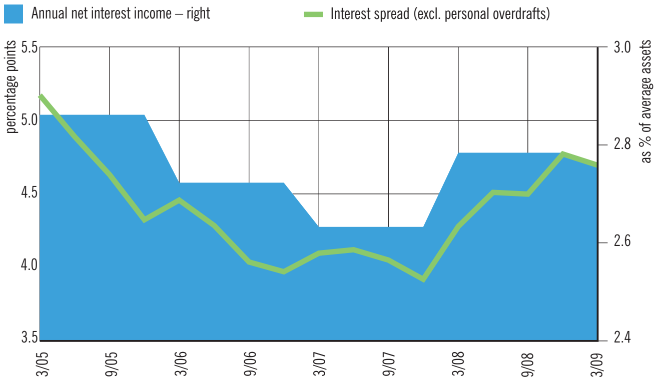
As banks managed to compensate for higher costs by higher income, the financial crisis has not yet affected their solid profitability. Since the rise in lending rates outpaced the rise in deposit rates, the interest spread[6] increased by almost 1 percentage point in 2008 and stayed at this high level in early 2009. This ended the convergence of interest rates in Croatia to those in the eurozone (Figures 62 and 63).

The redirection of a portion of banks' foreign reserves into loans increased the share of interest-bearing assets, which also raised the share of interest income in average assets (Figure 60). Thus the policy of releasing frozen bank assets, which the central bank implemented in late 2008 and early 2009, reduced regulatory costs and increased bank profitability. Expenses on loss provisions grew markedly in early 2009. Still, as their former level was low, this had no major impact on bank profitability. The increase in non-interest income was due to income from trading activities in the first quarter of 2009, while both income from fees and commissions and its structure remained unchanged relative to 2008 (Figure 61).

---

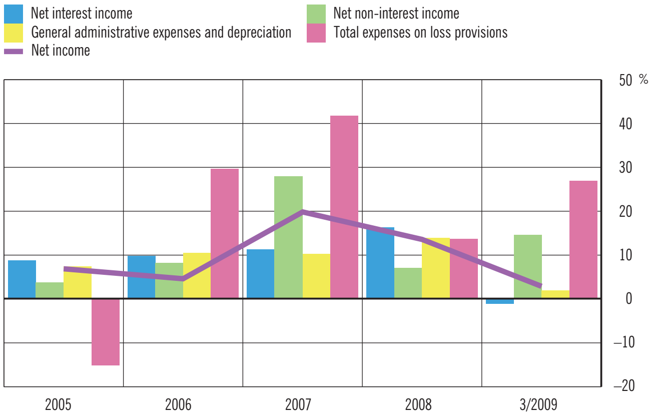
[6] The interest spread is calculated as the difference between the interest rate on total loans and the interest rate on total deposits, with personal overdrafts being excluded from loans. In the interest rate statistics, they are recorded as newly-granted loans in each month, which overestimates their share in total loans. Together with high nominal interest rates, this artificially increases the interest spread by some 2 percentage points.

Figure 63 Interest Spread (quarterly average of monthly interest rates) and Annual Net Interest Income



Source: CNB.

Figure 64 Growth in Selected Business Performance Indicators

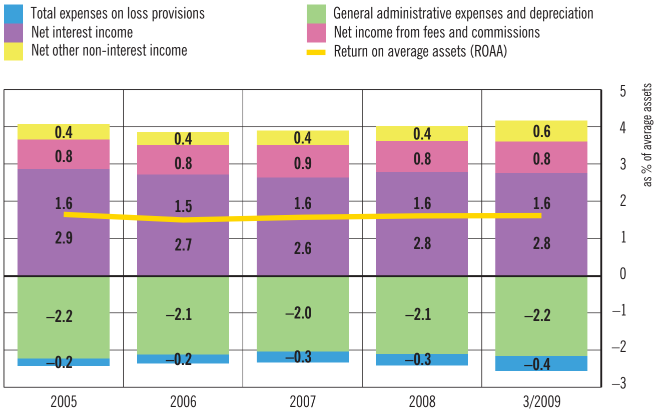


Source: CNB.

As a result, the growth in banks' profit after tax was 14% in 2008 but fell to 1% in the first quarter of 2009 (Figure 64). In 2008 and the first quarter of 2009, return on average assets remained unchanged compared with 2007, while the downward trend in return on average equity slowed down due to smaller capital injections (Figures 65 and 66).

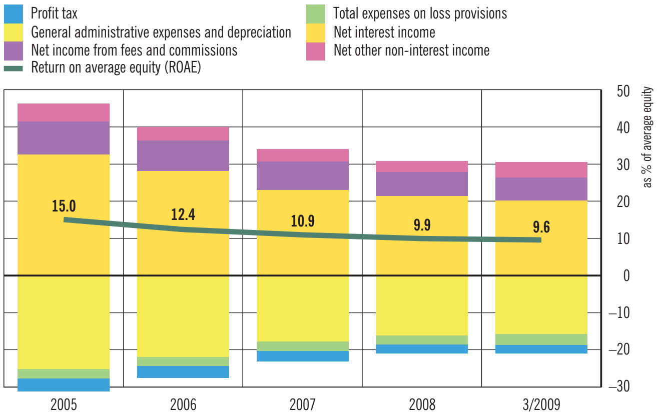
The increase in non-performing loans, which respond to macroeconomic disturbances with a time lag, will be the main threat to bank profitability and the stability of their operations in the forthcoming period. The currently high profitability of domestic banks and the satisfactory interest rate spread provide a good starting point from which to face the consequences of the recession. Net operating income that banks could earn in the period ahead should be sufficient to cover provisions for losses arising from a relatively large macroeconomic shock without undermining the solid capitalisation of the banking sector. Banks will also have to cut down administrative expenses to create additional room for absorbing expenses on loss provisions.

Figure 65 Contribution of ROAA Categories



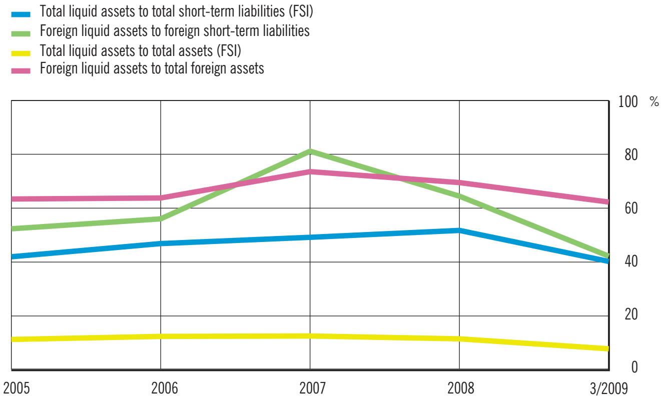
Source: CNB.

Figure 66 Contribution of ROAE Categories



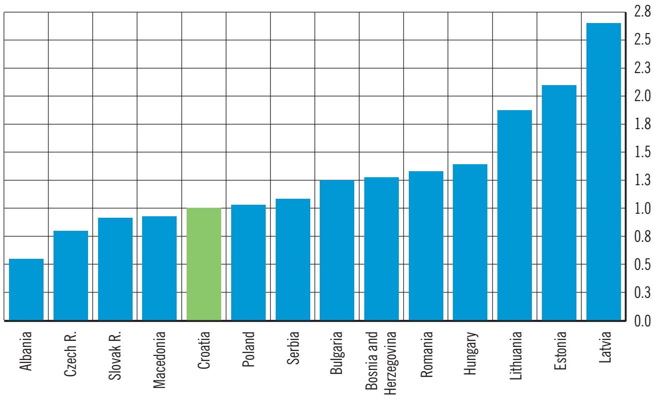
Source: CNB.

Figure 67 Liquidity Indicators



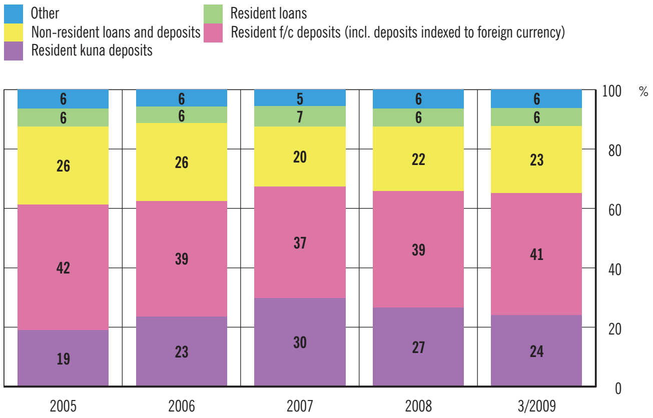
Source: CNB.

Figure 68 Loan-to-Deposit Ratio for the Private Sector in Selected Countries, as at 30 September 2008



Source: IMF, *International Financial Statistics*, March 2009.

Figure 69 Structure of Liabilities



Source: CNB.

Liquidity Risk

The release of a portion of immobilised liquid foreign assets of banks and domestic reserves, as well as the banks' reliance on short-term foreign sources to finance loans and substitute for reduced domestic deposits deteriorated all indicators of bank liquidity at end-2008 and in early 2009 (Figure 67). Broader liquidity indicators, which include domestic assets, deteriorated somewhat less than external liquidity indicators.

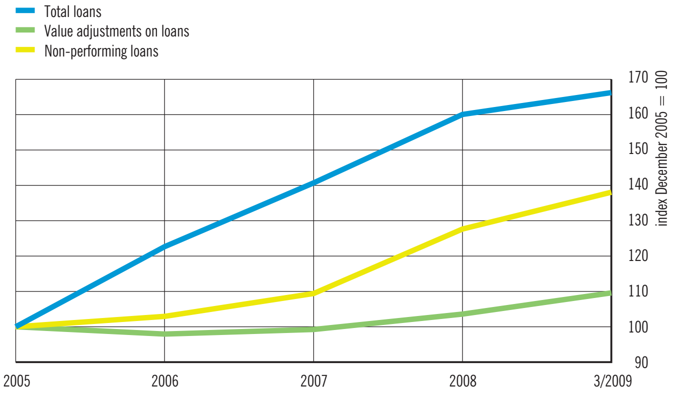
The loan-to-deposit ratio of the Croatian banking sector is relatively low compared with the banking sectors of other Central and Eastern European countries, which makes it relatively less dependant on foreign funding and thus less vulnerable to external shocks (Figure 68). Although foreign credit inflows, mostly from parent banks, were important for the maintenance of bank liquidity during the most severe turbulence on international financial markets, the relatively high stability of domestic sources was of key importance (Figure 69). Favourable trends in these factors, which are crucial for the maintenance of banking sector liquidity, are expected to continue as the global financial crisis begins to subside.

Credit Risk and Bank Capitalisation

Credit growth decelerated markedly in 2008 and is expected to remain sluggish in 2009, which will decrease the share of newly extended loans in total loans. The greater average age of loans and a significant deterioration of the macroeconomic environment in particular, will raise the ratio of non-performing loans to total loans (NPLR) in the forthcoming period, which is also suggested by the data for end-2008 and early 2009 (Figure 70). Notably slower economic activity increased the loan servicing burden of economic entities, while their funding costs further grew due to rising interest rates. A deterioration in banks' credit portfolios, which was slight in 2008, became more serious at the beginning of 2009. The sharpest increase in NPLR was recorded by the corporate sector, while the quality of loans to other sectors has not yet deteriorated significantly according to bank assessments. With regard to household loans, the most evident deterioration in the quality was recorded by credit card and other loans, while the quality of housing loans fell only slightly and that of car loans remained unchanged (Figure 71).

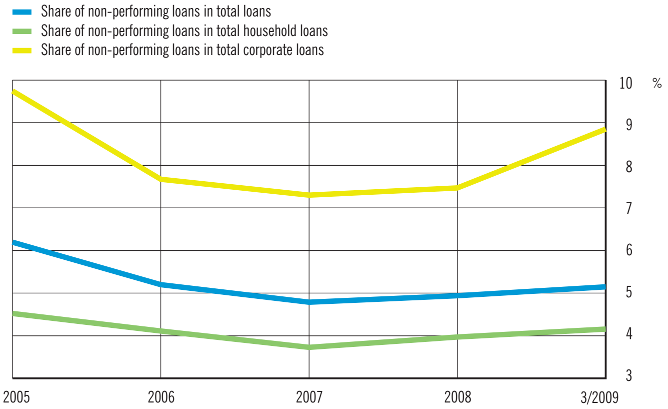
Value adjustments on loans grew noticeably from 2008 onwards but their increase still did not follow the rise in non-performing loans. This means that banks should in future create more reserves for losses arising from credit risk. After falling for several years, the coverage of total placements and contingent liabilities of the banking sector by value adjustments and provisions increased in early 2009 due to a parallel fall in placements and a rise in total value adjustments. In contrast, the coverage of non-performing loans was reduced as these loans grew faster than value adjustments (Figure 72).

Figure 70 Growth in Loans, Non-Performing Loans and Value Adjustments



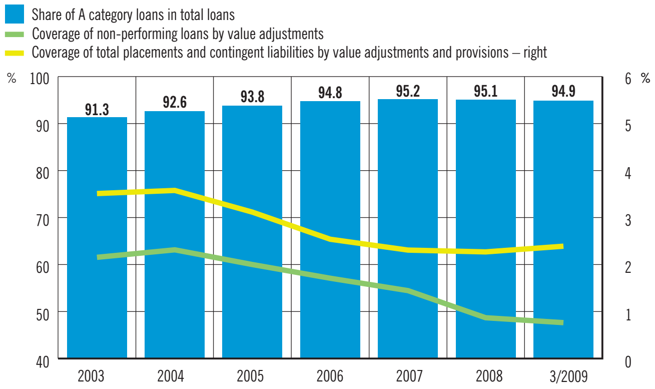
Source: CNB.

Figure 71 Ratio of Non-Performing Loans to Total Loans



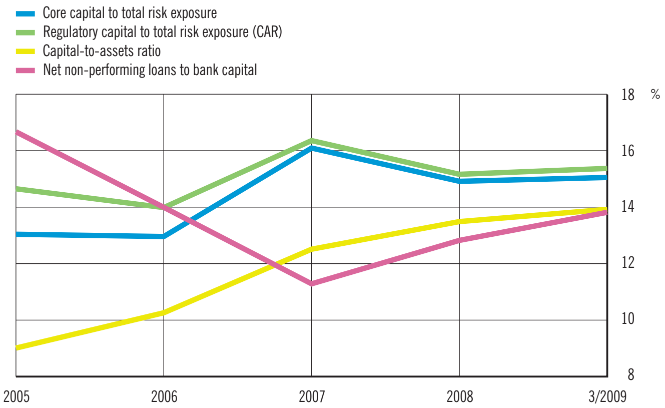
Source: CNB.

Figure 72 Loan Quality and the Coverage of Loans and Placements by Value Adjustments



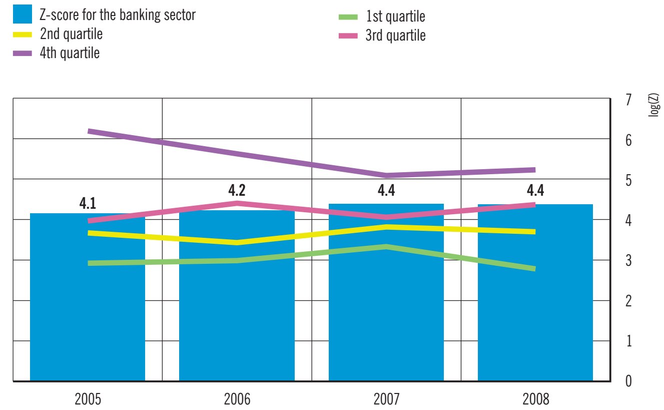
Source: CNB.

Figure 73 Capital Adequacy Ratios



Source: CNB.

Figure 74 Weighted Z-Score for the Banking Sector by Quartile



Source: CNB.

The strong capitalisation of the banking sector will certainly help in overcoming the negative trends already evident in the increase in the ratio of non-performing loans to bank capital. Capital adequacy decreased in 2008 mostly due to changes in the weights applied to calculate overall risk exposure. However, the solid capital base of banks was strengthened by late March 2009, as evidenced by the continued growth of the capital-to-assets ratio. The early 2009 growth in regulatory capital, which was due to the inclusion of profit[7] and the parallel stagnant growth in risk exposure, increased the capital adequacy ratio (Figure 73).

Banking sector stability in the observed period is also indicated by Z-score, which measures banks' insolvency risk (Figure 74). The maintenance of this index at a relatively high level in 2008 was due to the rise in banks' profitability and capitalisation and relatively low ROAA volatility in the previous period.[8] Z-index for the banking sector by quartile suggests that banks became increasingly different in terms of stability; Z-indices for the first two quartiles were reduced, while those for the other two quartiles increased in 2008. This illustrates the fact that there are significant differences among banks and that some bank groups are more vulnerable to shocks from the environment. Hence, it is important to group banks according to their strategic behaviour to gain a better perception of their resilience to shocks (see Box 6).

---

[7] The inclusion of retained earnings in banks' regulatory capital at end-2008 increased the capital adequacy ratio of the banking sector by 1 percentage point.

[8] For a more detailed description of Z-score see Box 5 Assessing Banking Sector Stability in Terms of Z-Score, *Financial Stability*, No. 1, June 2008.

Box 6 Revision of the Stress-Testing Methodology

The stress-testing methodology that has been used so far is based on relatively simplified assumptions that facilitate the interpretation of results but also reduce precision. Several segments of the methodology have been advanced to increase the reliability of results.

Improved Stress-Testing Method

Current improvements in the stress-testing methodology[1] add to the previously used model a direct impact of exchange rate changes and the option to use banks' net income to cover expenses on loan loss provisions. The direct impact of exchange rate changes is due to the fact that banks' paid-in capital is denominated in kuna, while banks' risk exposures are predominantly denominated in euro, which means that a depreciation of the kuna itself reduces the capital adequacy ratio. In contrast, operating income before provisions for losses in the current year provides the first buffer to banks against an increase in these costs.[2]

Table 1 Improved Stress-Testing Methodology

Before a shock:

$$CAR = \frac{RC}{ORE}$$

CAR = capital adequacy ratio
RC = regulatory capital
ORE = overall risk exposure

After a shock:

$$CAR = \frac{RC - I + NI}{ORE - I + F}$$

i = Impact on regulatory capital and overall risk exposure

$$I = AP * \Delta NPLR$$

AP = actual provisions
NPLR = ratio of non-performing loans to total loans

Actual provisions are equal to value adjustments arising from present asset quality and overall risk exposure:

$$AP=(TL_{B1}*\%PR_{B1}+TL_{B2}*\%PR_{B2}+TL_{B3}*\%PR_{B3}+TL_{C}*\%PR_{C})$$

TL_x= total loans in a certain quality group
PR_x= ratio of value adjustments on loans in a certain quality group to total loans in that group

F = exchange rate effect on the capital adequacy ratio

$$F=D*W*ORE$$

D = depreciation of the kuna
W = share of ORE exposed to currency changes
ORE = overall risk exposure

NI = net operating income before loss provisions

Source: CNB.

Strategic Groups in the Croatian Banking Sector

Another area to improve the stress-testing methodology is a differentiation between groups of banks according to the way they are affected by a particular macroeconomic shock. Hence, separate macroeconomic credit risk models for strategic groups of banks that behave similarly were assessed.

An application of strategic group theory to the Croatian banking system implies its division into different groups with a high degree of homogeneity.[3] Due to costs of strategy changes or the fact that resources are already allocated for other purposes the transition from one strategic group to another is hindered, which means that obstacles to mobility provide certain stability to strategic groups. Ward's hierarchical grouping method and the K-means clustering method were used simultaneously to group banks in the Croatian banking sector. Grouping was made by using 40 annual indicators for banks in 2006, 2007 and 2008, with indicators relating to three strategic dimensions: raising funds, using funds, and risk and profitability.

Banks were grouped so as to substitute the traditional division according to size, while retaining the same number of groups. Results of this grouping show a more even distribution of banks in a particular group; there are two groups of 12 banks each and one group of 9 banks (division according to size results in 6 large banks, 4 medium-sized banks and 23 small banks at end-2008). The first group comprises mostly universal banks whose shares of household and corporate loans are almost equal, while housing loans account for a substantial part of their credit portfolios. The second group is made up of personal banks that principally grant loans to households, from whom they receive the bulk of deposits. As most of these banks are former savings banks, they predominantly grant any-purpose loans to households. The third group consists of corporate banks whose loans to corporates account for the largest share of their assets and that obtain most of their deposits from the corporate sector. The system is dominated by universal banks, which hold 90% of total banking sector assets, while corporate and personal banks account for 7% and 3% respectively.

Table 2 Selected Characteristics of Strategic Bank Groups at End-2008, in %

	Universal banks	Personal banks	Corporate banks
Household loans/total loans	48.9	66.0	27.0
Housing loans/household loans	40.2	6.1	10.4
Corporate loans/total loans	42.0	28.8	67.7
Household deposits/total assets	40.1	63.0	30.0
Corporate deposits/total assets	11.6	5.2	20.5

Source: CNB calculations.

---

[1] A macroeconomic credit risk model is described in Box 4, *Financial Stability*, No.1, June 2008.

[2] A bank's negative income itself puts pressure on the bank's capital.

[3] It is possible that individual banks pursue their own idiosyncratic strategies.

The superiority of these groups over the standard division according to size will be examined by an econometric analysis of profitability sensitivity of bank groups to changes in macroeconomic variables by using the annual changes in real GDP and exchange rate.

Differences in coefficients and significance of independent variables suggest that the strategic group approach gathers banks that are more similar in terms of profitability sensitivity to changes in the macroeconomic environment, i.e. differences between bank groups are larger. At the same time, adjusted R2 is much larger for strategic groups, which suggests a higher degree of homogeneity within strategic groups of banks.

Table 3 Results of the Econometric Panel-Analysis of Banks' Profitability (ROE), Q1/2002-Q4/2008

	Group coefficient	Adjusted	Coefficient	
		R2	GDP	Exchange rate
Personal banks	3.55	0.34	0.45	0.38
Corporate banks	–1.40	0.13	3.15[a]	0.16
Universal banks	–2.15	0.27	0.49[b]	–0.69[b]
Large banks	4.06	0.02	0.68[b]	–0.70[c]
Medium-sized banks	–2.02	0.06	–0.14	–0.48
Small banks	–2.03	0.15	1.95[a]	0.13

[a] Significant at the level of 1%.
[b] Significant at the level of 5%.
[c] Significant at the level of 10%.
Source: CNB calculations.

A separate macroeconomic credit risk model was assessed for each group by using the annual rate of real GDP growth with a time lag of two quarters and annual changes in the exchange rate. The results indicate that there are considerable differences between macroeconomic credit risk models for strategic groups and for groups according to size. The group of corporate banks is most sensitive to changes in the economic cycle and domestic currency depreciation. This sensitivity can be attributed to the business orientation towards smaller companies whose reaction to a deterioration in macroeconomic conditions is most rapid. Personal banks are also highly sensitive due to the traditionally weak protection of the household sector against currency risk as well as their orientation to the somewhat more risky segment of household loans.

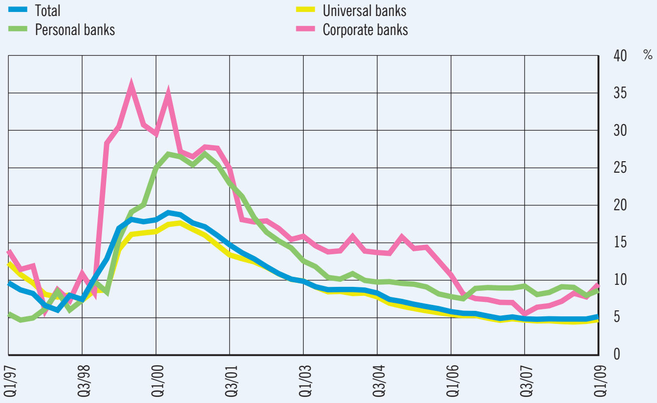
Table 4 Results of the Econometric Analysis of the Riskiness of Banks' Loan Portfolios (NPLR), Q1/1997-Q1/2009

	Group coefficient	Adjusted	Coefficient[a]	
		R2	GDP	Exchange rate
Personal banks	3.55	0.67	–12.7	8.0
Corporate banks	–1.40	0.74	–16.6	17.5
Universal banks	–2.15	0.75	–8.4	5.2
Large banks	4.06	0.74	–7.8	5.2
Medium-sized banks	–2.02	0.66	–9.2	6.8
Small banks	–2.03	0.80	–10.1	10.1
Total		0.78	–6.3	10.0

[a] All variables are significant at the level of 1%.
Source: CNB calculations.

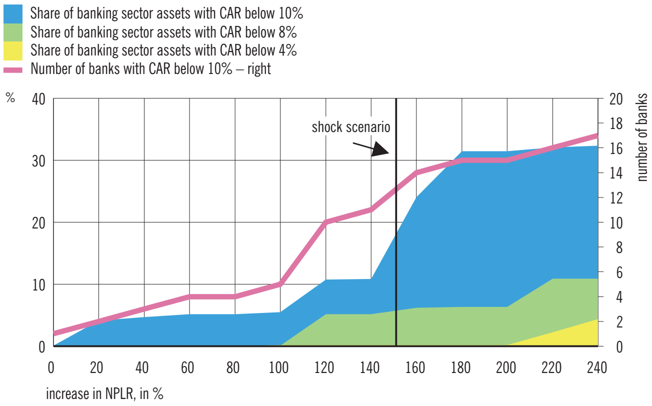
Developments in late 2008 and early 2009 are in line with the obtained results of the macro credit risk model. In late 2008, the ratio of non-performing loans to total loans of corporate banks began to grow markedly, while personal banks followed this trend with a certain lag.

Figure 1 Changes in NPLR by Strategic Bank Groups



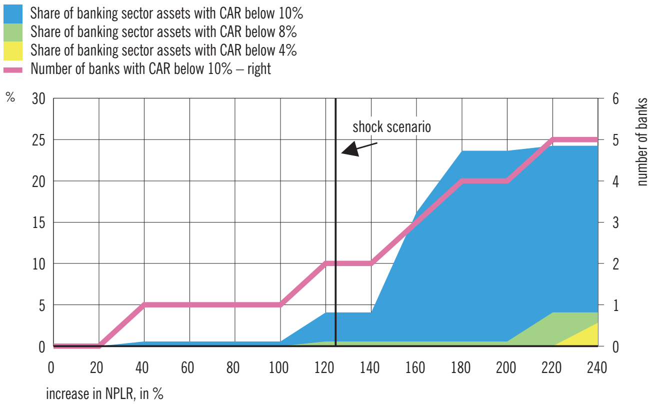
Source: CNB.

Figure 75 Assets and Number of Banks after a Shock under an Aggregate Credit Risk Model



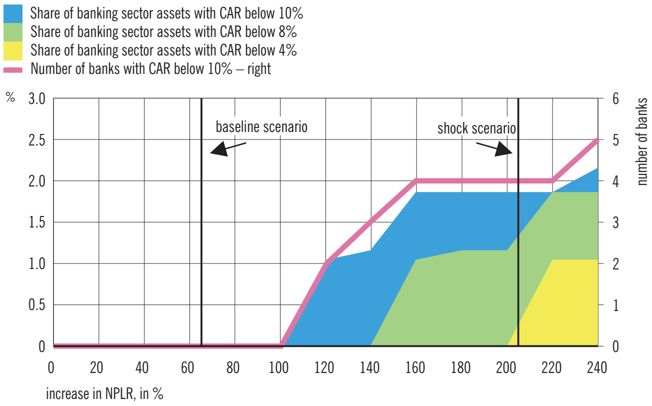
Source: CNB.

Figure 76 Assets and Number of Universal Banks after a Shock under a Specific Credit Risk Model



Source: CNB.

Figure 77 Assets and Number of Personal Banks after a Shock under a Specific Credit Risk Model



Source: CNB.

Banking Sector Resilience

After affecting their clients' operation, extremely adverse macroeconomic trends will also affect banks' balance sheets in 2009. The assessed credit risk models, which link economic activity and exchange rate with the dynamics of non-performing loans, were used to examine the possible effect of the simultaneous emergence of several risks combined together in a consistent macroeconomic scenario. The 2009 dynamics of non-performing loans is forecast on the basis of two scenarios – the baseline scenario, which assumes a GDP decline of 5% and the maintenance of a stable exchange rate, and a highly unlikely but, in the case of a more severe impact of the global crisis on Croatia, plausible shock scenario, which assumes a GDP decline of 6% and a 10% depreciation of the exchange rate. Since macro credit risk models use variables with a time lag, the simulated upsurge in the ratio of non-performing loans to total loans (NPLR) refers to end-2009 and early 2010 when this ratio could peak out.

The assessed impact of the baseline scenario under an aggregate model shows an increase in the NPLR of around 50%. However, the banks' net income before loss provisions[9] could fully absorb this increase and preserve bank capital. Under the shock scenario, NPLR at the banking sector level would grow by some 150% according to the macro model, while the immediate effects of the exchange rate and banks' net operating income offset each other, which decreases the capital adequacy ratio of the banking sector (Table 3). Under this scenario, assuming that banks raise no additional capital, the CAR would fall below 10% for twelve banks holding 12% of banking sector assets, below 8% for six banks holding 6% of assets and below 4% for only one small bank (Figure 75).[10]

The credit risk model assessed for individual bank groups shows much larger differences in response to changes in the macroeconomic environment and enables the identification of particularly vulnerable bank groups (Table 3 and Figures 76, 77 and 78). Under the baseline scenario, net operating income of universal banks is more than sufficient to absorb newly created expenses on loss provisions. Capital adequacy of personal banks would fall by 2.4 percentage points, but the CAR of these banks would stay at 14% due to the relatively high initial level of capitalisation. Corporate banks would bear the main brunt under this scenario as their CAR would fall below 11% (Table 3).

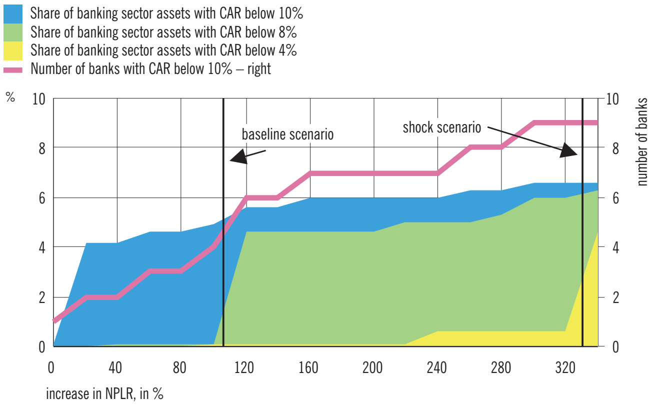
Under the shock scenario, capital adequacy of banks would also be affected by the exchange rate, while provisioning costs of all

---

[9] Net operating income before loss provisions was simulated by an internal model. Under the shock scenario, also simulated was a decline in this business performance category relative to the baseline scenario.

[10] Basel II implementation was postponed until 2010, which also postponed the increase in the minimum required capital adequacy ratio of banks from 10% to 12%. The reasons for the postponement of Basel II implementation are amendments to the Capital Requirements Directive (2006/48/EC and 2006/49/EC) and the Deposit Insurance Directive (94/19/EC), which will necessitate amendments to the Credit Institutions Act.

Figure 78 Assets and Number of Corporate Banks after a Shock under a Specific Credit Risk Model



Source: CNB.

Table 3 NPLR Increase and Banking Sector Capital Adequacy Ratio Relative to March 2009

	Baseline scenario			Shock scenario		
	NPLR increase (%)	CAR position (%)	Change in CAR relative to the initial position (pp)	NPLR increase (%)	CAR position (%)	Change in CAR relative to the initial position (pp)
Aggregate model	48	16.6	1.2	154	13.0	–2.4
Models by group						
Universal banks	63	16.7	1.2	124	13.7	–1.8
Personal banks	109	14.0	–2.4	202	9.1	–7.4
Corporate banks	140	10.8	–2.5	332	6.1	–7.2

Source: CNB calculations.

banks would exceed their net operating income. The CAR of universal banks would decline by 1.8 percentage points. At the same time, the CAR of personal and corporate banks, should they fail to raise additional capital, would drop by more than 7 percentage points, to 9.1% and 6.1% respectively. Corporate banks are sensitive to environmental changes because they have the lowest initial CAR. Furthermore, as the net operating income of nearly half of them was negative at the beginning of 2009, their capital has already been burdened. Personal banks have initially higher CARs, which reduces their relatively high exposure to losses during the downward stage of the business cycle.

The relatively high sensitivity of individual bank groups to the business cycle, which lead to the higher sensitivity of the banking sector to shocks compared to the aggregate model, arises from the use of historical data including the banking crisis period of the late 1990s (Table 4). The use of these data is limited due to methodological breaks in the series of non-performing loans data, though attempts were made to correct them, which could misrepresent the actual reaction of banks. Furthermore, due to advances in risk management, which were spurred also by the banking crisis experience, as well as ownership and regulatory changes, the actual sensitivity of individual bank groups could be lower than shown by the assessed models. However, since NPLR is calculated based on frequently over-optimistic bank assessments of the quality of credit portfolios and since banks can roll over bad loans and thus postpone their classification into irrecoverable claims, the actual share of non-performing loans is probably larger than suggested by the current data.

Table 4 Comparison of Stress Test Results of Aggregate and Specific Credit Risk Models under a Shock Scenario

	Personal banks	Corporate banks	Universal banks	Sum of groups	Aggregate model
Number of banks with CAR below 10%	4	9	2	15	12
Share of banking sector assets with CAR below 10%	1.9	6.6	4.1	12.5	11.6
Share of banking sector assets with CAR below 8%	1.9	6.3	0.6	8.7	6.2
Share of banking sector assets with CAR below 4%	0.0	4.6	0.0	4.6	0.1

Source: CNB calculations.

List of Figures and Tables

Figure 1 Financial Stability Map 7
Figure 2 Changes in Key Monetary and Prudential Policy Measures 9
Table 1 Economic Growth, Exports and Industrial Production in Selected Developed and Emerging Market Countries 11
Table 2 Fiscal Balance, Current Account Balance and External Debt of Selected Developed and Emerging Market Countries 11
Figure 3 Fed's and ECB's Key Interest Rates, EONIA and USLIBOR 12
Figure 4 Capital Inflows to European Emerging Market Countries 12
Figure 5 BIS Reporting Banks' Claims on Central and Eastern European Countries 12
Figure 6 BIS Reporting Banks' Claims on Central and Eastern European Countries by Sector 12
Figure 7 Yields on High-Risk Government and Corporate Bonds 13
Figure 8 Spread on Benchmark Eurobonds of Selected Countries and Benchmark German Bonds Maturing in 2011 13
Figure 9 Yields on Croatian and Benchmark German Bonds Maturing in 2014 and Their Spread 13
Figure 10 CDS Spreads for Selected Countries 13
Figure 11 CDS Spreads for Parent Banks of Croatian Banks 14
Figure 12 Business and Consumer Confidence Indices 14
Figure 13 Foreign Capital Inflows and GDP Growth in Croatia 14
Figure 14 GDP Growth Pattern (contribution to growth) 14
Figure 15 Savings and Investment – Total and by Sector 15
Figure 16 Structure of Foreign Direct Investment 15
Figure 17 Short-Term External Debt 15
Figure 18 Total External Debt by Creditor 15
Figure 19 Selected Indicators of External Vulnerability 15
Figure 20 Contribution of Individual Components of Optimal International Reserves 15
Figure 21 Average Interest Rates on T-Bills and in the Interbank Money Market 16
Figure 22 Kuna/Euro Exchange Rate – Spot and Forward
Figure 23 General Government Fiscal Position 16
Box 1 17
Figure 1 Spreads on Emerging Market Sovereign Debt and the VIX Index 17
Table 1 Regression Model Results 17
Figure 2 Model Residuals by Country 18
Box 2 19
Figure 1 Share of a Banking Group's Assets Related to its Branches in Central and Eastern Europe 19
Figure 2 Percentage of the Variation in CDS Spreads for Emerging Market Countries Explained by the Principal Component 19
Figure 3 Correlation with the Principal Component for Countries 19
Figure 4 Percentage of the Variation in CDS Spreads for Parent Banks of Croatian Banks and the Largest European and American Banks Explained by the Principal Component 20
Figure 5 Correlation with the Principal Component for the Banks 20
Box 3 21
Figure 1 Net Financial Position of Domestic Sectors with respect to the Rest of the World 21
Figure 2 Net Financial Position of Selected Domestic Sectors with respect to the Rest of the World by Equity and Debt Instrument 21
Table 1 Inter-Sector Claims and Liabilities at end-2007 and end-2008 22
Figure 24 Household Debt 23
Figure 25 Annual Change in Unemployment, Employment and Wages 23
Figure 26 Household Loans by Purpose 24
Figure 27 Currency Breakdown of Household Loans 24
Figure 28 Household Loans by Interest Rate Variability 24
Figure 29 Breakdown of Household Loans by Remaining Maturity 24
Figure 30 Household Debt and Debt Burden 25
Figure 31 Household Loan-to-Deposit Ratio in Selected Central and Eastern European Countries 25
Figure 32 Household Financial Assets 25
Box 4 26
Figure 1 Share of Debt of Households in Individual Income Brackets in Total Sector Debt 26
Figure 2 Ratio of the Average Loan Payment to Disposable Income per Household Member 26
Figure 3 Share of Households with a Negative Financial Margin in the Total Number of Indebted Households 27
Figure 4 Estimate of Banks' Exposure at Default Based on Loans to Risky Households 27
Figure 5 Potentially Vulnerable Households in 2007 27

Figure 33 Housing Loans and HREPI on a quarterly basis 28
Figure 34 Growth in Domestic and Foreign Loans to the Real Estate Sector 28
Figure 35 Comparison of Interest Rates on Housing Loans in Croatia and the Eurozone 29
Figure 36 Financial Availability of Housing Loans 29
Figure 37 Change and Non-Financial Corporate Debt Stock 30
Figure 38 Annual Growth Rate of Non-Financial Corporate Debt 30
Figure 39 Non-Financial Corporate Debt 31
Figure 40 External Debt Allocation by Sectors from September 2008 to March 2009 31
Figure 41 Allocation of Domestic Bank Loans by Sectors from September 2008 to March 2009 31
Figure 42 Breakdown of Newly-Granted Bank Loans to Non-Financial Corporations by Maturity and Currency 31
Figure 43 Share of Bank Non-Kuna Loans and Non-Financial Corporate External Debt in Total Loans 31
Figure 44 Currency Exposure in March 2009 31
Figure 45 Breakdown of Bank Loans to Non-Financial Corporations by Interest Rate Variability 32
Figure 46 Interest Rates on Long-Term Loans to Non-Financial Corporations in Croatia and the Eurozone 32
Figure 47 Interest Rates on Short-Term Loans to Non-Financial Corporations in Croatia and the Eurozone 32
Figure 48 Ratio of Transaction Account Deposits of Non-Financial Corporations to Gross Value Added 33

Box 5

Figure 1 Credit Risk Assessment System in the Croatian National Bank 34
Figure 2 Sum of Accurately Classified Placements (placement rating corresponds to debtor rating) Conditional on the Criterial Threshold 34
Table 1 Migration Matrix of the Corporate Sector 35
Figure 3 Relative Share of Non-Financial Corporates That Were More than 90 Days Overdue During Previous Two Years 35
Table 2 Logistic Regression Results 36
Figure 49 Banking Sector Assets 37
Figure 50 Banking Sector Liabilities 37
Figure 51 Annual Growth Rate of Major Banking Sector Balance Sheet Items 38
Figure 52 Currency Breakdown of Loans 38
Figure 53 Currency Breakdown of Deposits 38
Figure 54 Currency Breakdown of Non-Kuna Loans 39
Figure 55 Bank Exposure to Currency Risk 39
Figure 56 Share of Hedged Loans in Total Loans Exposed to CICR 39
Figure 57 Distribution of Bank Assets by Assigned Weight and the Average Weight 40
Figure 58 Share of (Gross) Loans and Liabilities of Banks with Interest Rate Variable within Three Months in Total Gross Loans and Liabilities of Banks 40
Figure 59 Structure of Total Expenses 40
Figure 60 Structure of Total Income 41
Figure 61 Structure of Income from Fees and Commissions 41
Figure 62 Selected Interest Rates (quarterly average of monthly interest rates) 41
Figure 63 Interest Spread (quarterly average of monthly interest rates) and Annual Net Interest Income 42
Figure 64 Growth in Selected Business Performance Indicators 42
Figure 65 Contribution of ROAA Categories 42
Figure 66 Contribution of ROAE Categories 42
Figure 67 Liquidity Indicators 43
Figure 68 Loan-to-Deposit Ratio for the Private Sector in Selected Countries, as at 30 September 2008 43
Figure 69 Structure of Liabilities 43
Figure 70 Growth in Loans, Non-Performing Loans and Value Adjustments 44
Figure 71 Ratio of Non-Performing Loans to Total Loans 44
Figure 72 Loan Quality and the Coverage of Loans and Placements by Value Adjustments 44
Figure 73 Capital Adequacy Ratios 45
Figure 74 Weighted Z-Score for the Banking Sector by Quartile 45

Box 6

Table 1 Improved Stress-Testing Methodology 46
Table 2 Selected Characteristics of Strategic Bank Groups at End-2008, in % 46
Table 3 Results of the Econometric Panel-Analysis of Banks' Profitability (ROE), Q1/2002-Q4/2008 47
Table 4 Results of the Econometric Analysis of the Riskiness of Banks' Loan Portfolios (NPLR), Q1/1997-Q1/2009 47
Figure 1 Changes in NPLR by Strategic Bank Groups 47
Figure 75 Assets and Number of Banks after a Shock under an Aggregate Credit Risk Model 48
Figure 76 Assets and Number of Universal Banks after a Shock under a Specific Credit Risk Model 48
Figure 77 Assets and Number of Personal Banks after a Shock under a Specific Credit Risk Model 48
Figure 78 Assets and Number of Corporate Banks after a Shock under a Specific Credit Risk Model 49
Table 3 NPLR Increase and Banking Sector Capital Adequacy Ratio Relative to March 2009 49
Table 4 Comparison of Stress Test Results of Aggregate and Specific Credit Risk Models under a Shock Scenario 49

Abbreviations and Symbols

Abbreviations

BIS	– Bank for International Settlements
bn	– billion
CAR	– capital adequacy ratio
CBS	– Central Bureau of Statistics
CDA	– Central Depository Agency
CDS	– credit default swap
CEE	– Central and Eastern European
CICR	– currency-induced credit risk
CNB	– Croatian National Bank
CPI	– consumer price index
CROBEX	– Zagreb Stock Exchange Index
ECB	– European Central Bank
EMBI	– Emerging Market Bond Index
EMU	– Economic and Monetary Union
EONIA	– Euro Overnight Index Average
EU	– European Union
EUR	– euro
EURIBOR	– Euro Interbank Offered Rate
f/c	– foreign currency
FDI	– foreign direct investment
Fed	– Federal Reserve System
FINA	– Financial Agency
FSI	– financial soundness indicators
GDP	– gross domestic product
HANFA	– Croatian Financial Services Supervisory Agency
HBS	– Household Budget Survey
HREPI	– hedonic real estate price index
HRK	– Croatian kuna
ILO	– International Labour Organization
IMF	– International Monetary Fund
m	– million
MoF	– Ministry of Finance
MRR	– marginal reserve requirements
NCEA	– National Classification of Economic Activities
NPLR	– ratio of non-performing loans to total loans
ON USLIBOR	– overnight US dollar London Interbank Offered Rate
pp	– percentage points
RC	– Republic of Croatia
ROAA	– return on average assets
ROAE	– return on average equity
SDR	– special drawing rights
T-HT	– HT – Hrvatske telekomunikacije d.d.
VIX	– volatility index
ZSE	– Zagreb Stock Exchange

Symbols

–	– no entry
....	– data not available
0	– value is less than 0.5 of the unit of measure being used
Ø	– average
a, b, c,...	– indicates a note beneath the table and figure
*	– corrected data
( )	– incomplete or insufficiently verified data

ISSN 1846-9264