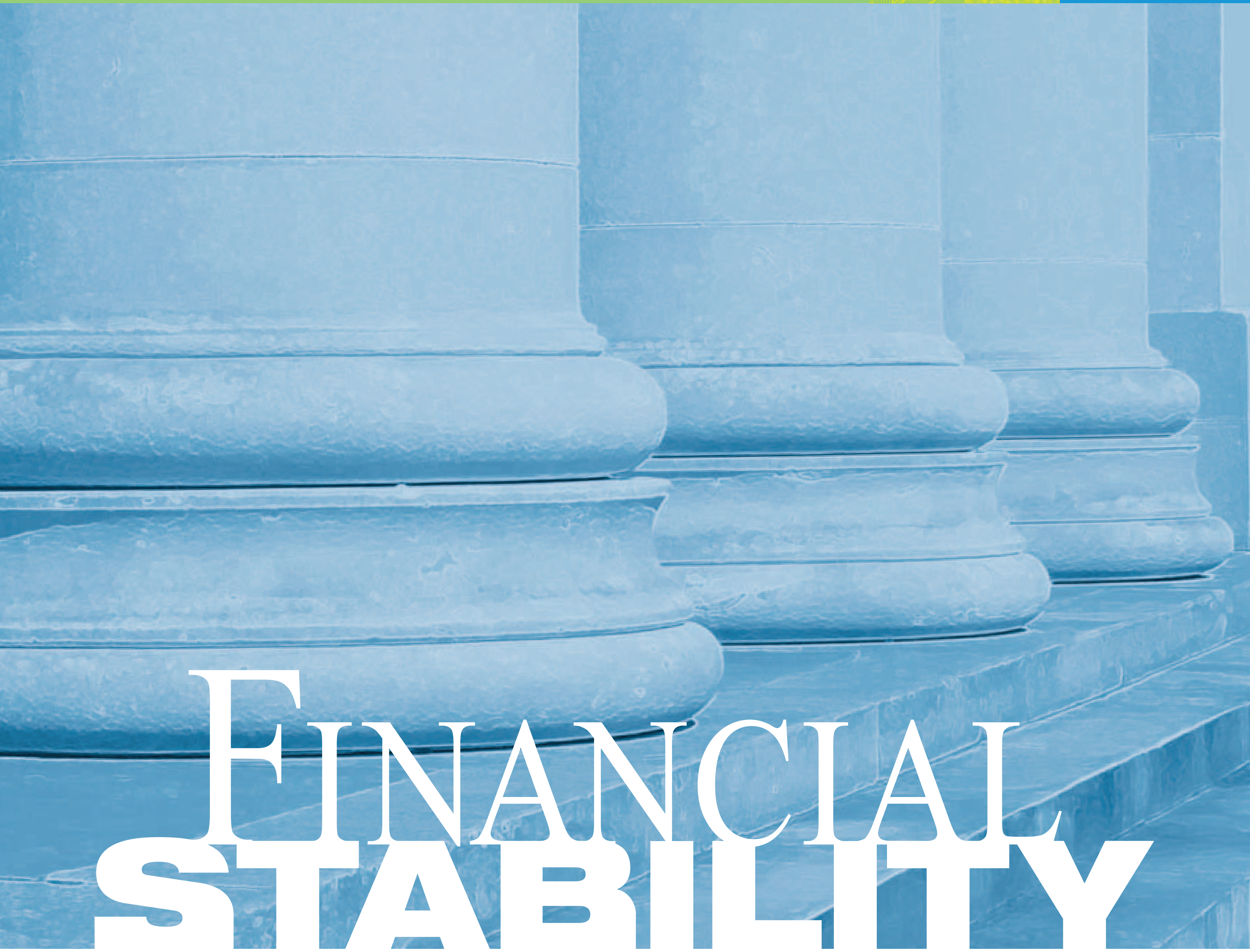
No.
7
Year 4
VI 2011



FINANCIAL STABILITY

CROATIAN NATIONAL BANK

CROATIAN NATIONAL BANK

Financial Stability

No. 7, Zagreb, June 2011

PUBLISHER
Croatian National Bank
Publishing Department
Trg hrvatskih velikana 3, 10002 Zagreb
Phone: ++385 1 45 64 555
Contact phone: ++385 1 45 65 006
Fax: ++385 1 45 64 687

WEBSITE
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 400 copies

ISSN 1846-9264 (print)
ISSN 1847-0017 (online)

Contents

Introductory remarks 5

Overall assessment of the main risks and challenges to financial stability policy 7

Macroeconomic environment 10

Government sector 19

Box 1 Financial accounts for Croatia 23

Box 2 The link between interest rates on corporate loans and country risk 25

Household sector 27

Box 3 The role of supply and demand in cyclical fluctuations of household debt 30

Real estate sector 33

Non-financial corporate sector 35

Box 4 Macroeconomic shocks and corporate credit risk 39

Banking sector 42

Box 5 Credit risk models for specific bank portfolios 54

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, because financial stability is based on the confidence of financial market participants, it largely depends in turn on their perceptions and behaviour, which are subject to cyclical swings. 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 the 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, for 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.

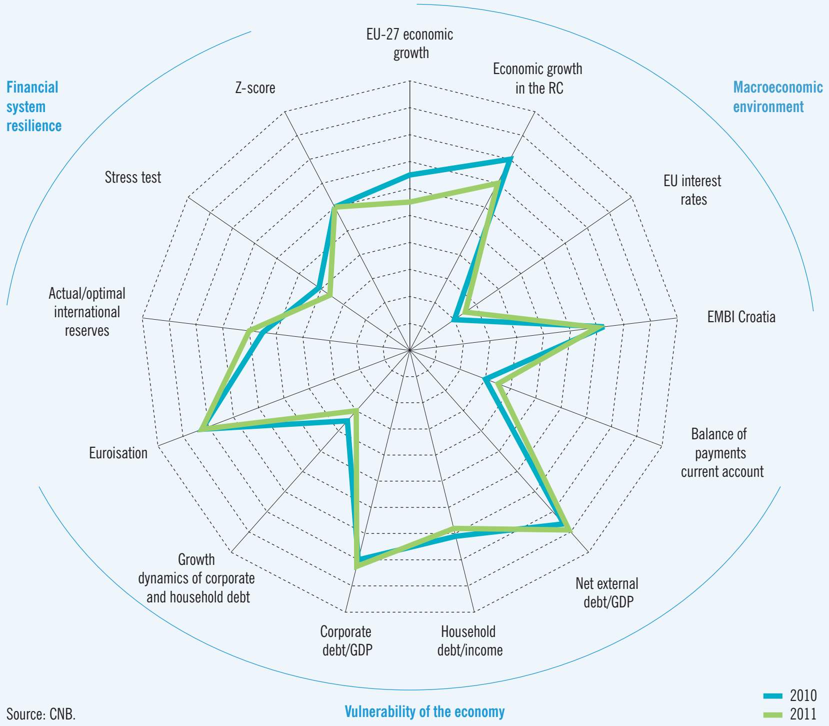
The CNB shares the responsibility for overall financial system stability with the Ministry of Finance and the Croatian Financial Services Supervisory Agency (HANFA), which are responsible for the regulation and supervision of non-banking financial institutions. Furthermore, owing to the high degree to which the banking system is internationalised, as reflected in the 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 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 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.

Notwithstanding the expected improvement in the domestic and international macroeconomic environment in 2011, the continued crisis in the market for sovereign debt of peripheral European countries will keep financial stability risks stemming from a high external vulnerability at an elevated level. The well-capitalised banking sector has remained resilient to the materialisation of an adverse macroeconomic scenario. Still, only faster economic growth driven by foreign demand would mitigate more permanently risks to financial stability in the forthcoming period.

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. the 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 an increase in risks to financial stability, while a decrease in the area suggests their reduction.

The somewhat weaker economic performance of several large countries in late 2010 and early 2011 should not much affect the dynamic growth path of the global economy, which is expected to continue its robust recovery through to the end of 2011. However, real economic developments across and within global regions will continue to be heterogeneous.

Developed countries that were at the epicentre of the financial crisis have continued to recover relatively slowly. Apart from long-term effects of financial disturbances, the weakness of the recovery in these countries is associated with fiscal adjustment programmes prompted by deteriorated fiscal positions during the crisis; almost all countries began to implement such programmes in 2011. Acting in the same direction is the undermining of private sector confidence triggered by the expected gradual withdrawal of the extraordinary monetary stimulus measures to restrain increased inflationary pressures. At the same time, the largest emerging markets continue to grow dynamically and are facing problems associated with excessive capital inflows and overheating of the economy due to solid fundamentals and to the extraordinary monetary policy measures implemented in developed countries.

A similar pattern of asymmetric growth is visible within the EU as well, so that the recovery of the whole area has been relatively slow. “Core” European economies, which recovered quickly, have continued to grow strongly. By contrast, economic growth in peripheral economies has continued to be much slower than the area average, particularly compared with growth rates in the pre-crisis period. The slow recovery coupled with an expansive public debt path has continued to affect adversely the solvency of the most vulnerable countries, which had already absorbed considerable international support. The debates surrounding decisions on possible new support packages continue to generate tensions and are a constant source of uncertainties in international financial markets. In view of the lack of an effective solution to the sovereign debt crisis, the crisis could spread to countries with substantial external and fiscal vulnerabilities, including Croatia.

Against this background, the Croatian economy is expected to begin recovering in 2011, after an almost uninterrupted three-year contraction. Foreign demand should continue to provide a strong boost to the domestic economic recovery, while the revival of domestic demand should be mild in order to prevent a major increase in external vulnerabilities. The main contribution to external debt growth will come from the increase in public debt, running parallel with the steady moderate pace of private sector borrowing. The process of household deleveraging under the impact of persistent negative tendencies in the labour market could continue to restrain the rise in external imbalances. Nevertheless, only more rapid growth could enhance prospects for external sustainability.

The strengthening of the global economic recovery and the slow recovery of the domestic economy could have a favourable impact on financial stability in Croatia. Since the capital adequacy ratio of the banking sector is still relatively high, banks should have no problems in meeting future stricter capital requirements associated with Basel III implementation. Parent banks have continued to support their local subsidiaries strongly and their overall exposure to Croatian subsidiaries is more than twice as high as the capital. In addition, the earnings of banks have proved to be relatively resilient to shocks and their profits stabilised at a level about one-third lower than in the pre-crisis period. Pressures on banking sector solvency in the form of a sharp increase in non-performing loans could start to abate slowly in 2011, which will be an additional stabilising factor. Still, as existing non-performing loans could generate additional value adjustment costs, one may hardly expect that banking sector earnings will improve in the short run.

While near-term prospects for financial stability are relatively good, the main risk to financial stability in the medium run is the slow reallocation of economic resources from production to meet domestic demand to production for foreign markets, and from production for government consumption to production to meet private sector demand. The high external debt level could be stabilised only by a significant acceleration of economic growth driven by exports and export-oriented investments, coupled with a relatively slower growth in personal and public consumption. The use of the exchange rate as an economic policy instrument in a highly euroised economy is considerably constrained by the risks it entails for monetary and financial stability. Therefore, it is necessary to resort to faster structural reforms to achieve the necessary change in relative prices.

Croatia is one of the few countries that have continued to pursue an expansive fiscal policy by means of discretionary tax measures in 2011. Although the Fiscal Responsibility Act (FRA) outlines a fiscal adjustment path over the medium term, its postponement for the year ahead is a risky strategy against the background of heightened uncertainties in international financial markets and unfavourable domestic fiscal indicators that have started to exceed the thresholds associated with increased insolvency risk in emerging market economies. By mitigating the country’s insolvency risks, more rapid fiscal adjustment could lower the risk premium, and thus also interest rates for the private sector, thereby providing a boost to growth.

In light of the risks described, this report sends several messages. An acceleration of reforms aimed at enhancing potential growth is crucial to attain both external and fiscal sustainability. To achieve fiscal sustainability, it is also necessary to implement measures aimed at a balanced budget as soon as possible. Banks should also provide more vigorous support to the process of the reallocation of production resources. Corporate debt has grown at a steady pace, also due largely to domestic banks. However, banks continue to be oriented strongly towards activities in the non-tradable sector, primarily construction and real estate management. There are indications that, in deciding on loan approvals, bankers are often guided by a desire to support major clients and not by an assessment of a borrower’s solvency or the channelling of loans to the most profitable projects. Such a strategy can be mutually beneficial if difficulties facing a borrower are of a temporary nature. However, the frequency of this behavioural pattern in the banks' loan allocation process hampers the movement of capital among activities and slows down changes in the economic structure. The slowdown in inflows of new non-performing loans provides banks with an opportunity to update their assessment of the prospects for major debtors and stop the rise in exposure to existing high-risk clients. The slower deterioration in the loan portfolio quality could give banks room to reconsider credit support to some debtors to which they have considerable exposures, write-off possible loses on these loans without excessively undermining their earnings, and turn to entrepreneurs with the highest long-term growth potential.

In such an environment, the central bank has steadily attempted to encourage banks to maintain capital adequacy at a level much higher than the regulatory minimum because this would ensure not only their solvency, even in case of possible macroeconomic shocks, but also the fulfilment of their basic function – to direct savings into profitable projects. Stress test results show that the banking sector would remain solvent even under an extreme, but plausible, adverse macroeconomic scenario. Also, the central bank has maintained international reserves at a level that should be sufficient to overcome shocks in the international environment without a credit crunch, despite the fact that foreign liabilities maturing in 2011 are larger than in 2010 and notwithstanding the fall in bank foreign liquid assets early in the year. All this should enable banks to maintain a reliable supply of loans to the economy even in case of stronger macroeconomic disturbances.

By their nature, central bank measures to maintain the country's external liquidity serve exclusively as buffers to temporary shocks in the international environment. Their effectiveness is limited when there are more permanent threats to financial stability stemming from continued slow growth should there be delays in structural reforms and fiscal adjustment.

Macroeconomic environment

In conditions of increased risk of crisis spillover from the market for sovereign debt of peripheral eurozone countries to other countries, decisive implementation of fiscal and structural adjustment policies is necessary to reduce vulnerabilities to stops in capital inflows and spur more dynamic growth, and thereby bolster financial market confidence in the country's solvency.

The ongoing global economic recovery coupled with the drop in risk aversion and a gradual increase in international capital flows enhanced global financial stability in late 2010 and the first half of 2011 (Table 1 and Figure 2). In such conditions, a withdrawal of fiscal and monetary stimulus measures, which were introduced at the peak of the financial crisis, has either begun or has been announced (Table 2 and Figure 3).

However, the turbulence in the market for sovereign debt of peripheral eurozone countries has remained the focus of a possible renewed eruption of the financial crisis of global proportions (Tables 2 and 3 and Figure 4).

Financial markets calmed down to some extent after the approval of the financial assistance package to Ireland in October 2010. This was also due to announcements that improvements would be made to the existing EFSF (European Financial Stability Fund) assistance system in spring 2011 and a proposed comprehensive solution in the form of a permanent financial stability mechanism in the eurozone, to be set up by 2013 and include closer coordination and supervision of macroeconomic policies. Still, the solutions offered in March 2011 failed permanently to appease the markets primarily due to uncertainties regarding the role of private creditors in the future debt restructuring of eurozone economies. Therefore, the situation again

Table 1 Economic growth, exports and industrial production in selected developed and emerging market countries

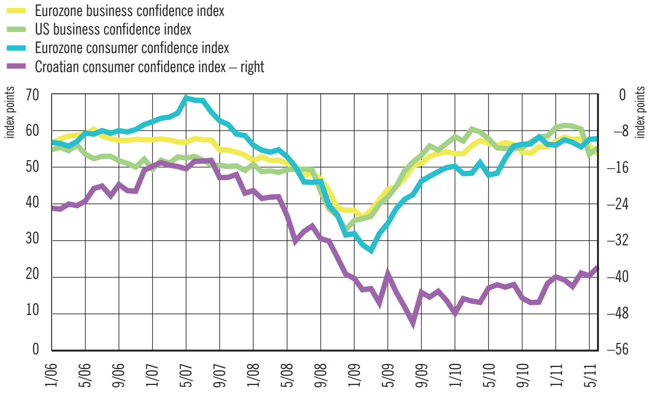
	Annual GDP growth rate		Quarterly GDP growth rate, $\Delta Q_t/Q_{t-1}$		Annual rate of change in exports of goods		Annual rate of change in industrial production (seasonally adjusted)	
	2010	2011[a]	Q4/2010	Q1/2011	Q4/2010	Q1/2011	Q4/2010	Q1/2011
USA	2.9	2.6	0.8	0.4	17.8	18.6	6.2	5.4
EU	1.8	1.8	0.2	0.8	19.6	18.9	7.7	6.4
Germany	3.6	2.6	0.4	1.5	20.7	19.8	12.6	12.3
Italy	1.3	1.0	0.1	0.1	19.6	18.4	5.1	2.2
Slovenia	1.2	1.9	0.5	0.3	14.4	19.0	8.2	9.1
Slovak R.	4.0	3.5	0.9	1.0	20.7	24.0	16.8	11.5
Czech R.	2.3	2.0	0.5	0.9	24.0	24.3	11.0	11.2
Poland	3.8	4.0	0.8	1.0	17.6	13.1	9.3	7.7
Hungary	1.2	2.7	0.5	0.7	19.8	22.5	9.7	11.4
Estonia	3.1	4.9	2.5	2.4	60.3	59.8	33.8	31.7
Latvia	–0.3	3.3	0.9	0.2	29.1	40.7	17.9	9.5
Lithuania	1.3	5.0	1.8	3.5	45.6	49.6	17.2	14.8
Bulgaria	0.2	2.8	0.5	0.6	32.7	56.2	5.2	9.7
Romania	–1.3	1.5	0.1	0.7	32.1	39.6	6.6	9.8
Croatia	–1.2	1.0	–1.1	–0.8	25.9	–3.4	–1.7	–5.0

[a] Forecast.
Sources: Eurostat, CBS, Bloomberg, OECD and CNB (for Croatia).

became unstable in April 2011, when the markets raised risk premiums on Portuguese sovereign bonds to prohibitive levels and thus "extorted" an EU and IMF financial assistance package worth EUR 78bn (Figures 4 and 5).

The lack of investor confidence in the sustainability of Portugal's public debt is attributable to the high external debt of the private sector which, against the backdrop of prolonged economic stagnation caused by poor international competitiveness, could turn into debt of the public sector (Table 3 and Figure 4).

Figure 2 Business and consumer confidence indices



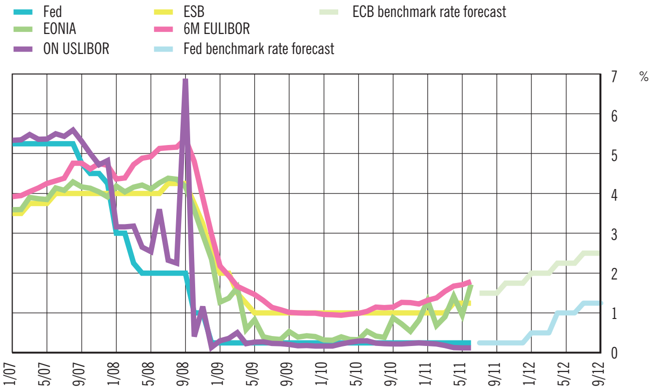
Sources: Bloomberg and CNB.

The assistance package prevented a further spike in Portugal's risk premium, but failed to lower it significantly. This was also due to mounting concerns about Greek solvency and the resultant increase in the risk premium after it became obvious that fiscal consolidation was not progressing at a planned pace and that Greece would not be able to return to the sovereign debt market in 2012, as envisaged in the assistance programme of May 2010 (Table 3 and Figure 4).

The deterioration of the situation in Greece raised uncertainties about the future functioning of the European Stability Mechanism (ESM) and highlighted the still unsolved basic dilemma of whether the new mechanism would include the option of the debt restructuring/bankruptcy of a eurozone member.

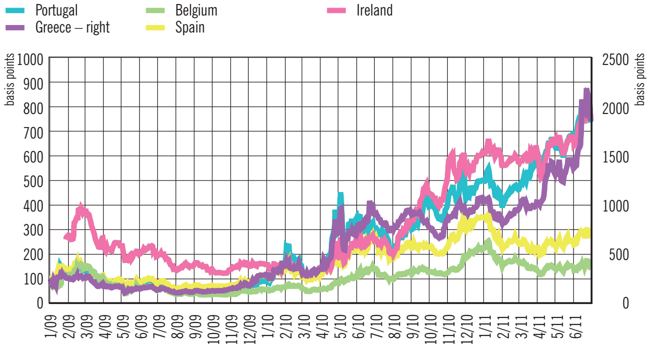
A group of eurozone countries with traditionally strong finances argues for a system that would include the option of the debt restructuring/bankruptcy of a member state, in which private creditors would also participate in bankruptcy costs. This approach is based on the orthodox market logic that encourages market participants to assess a country's risk appropriately and prevents moral hazard, while keeping account of resistance by the electorate in countries that bear the main brunt of financing assistance to vulnerable countries.

Figure 3 Key interest rates of the main central banks and leading market interest rates



Sources: Fed, ECB and Bloomberg.

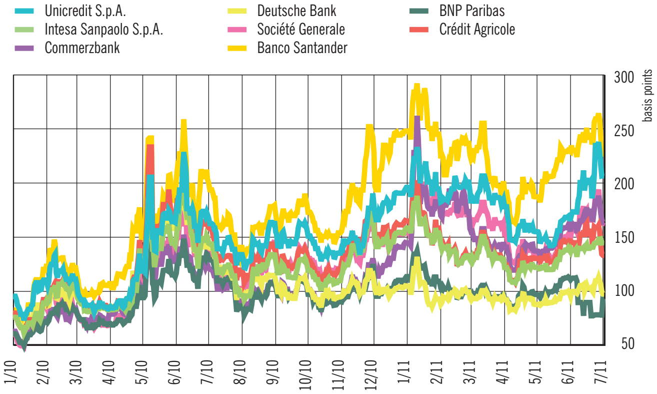
Figure 4 CDS[a] spreads for 5-year bonds of selected eurozone countries



[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 5 CDS spreads for 5-year bonds of selected banks



Source: Bloomberg.

Table 2 Fiscal balance and current account balance in selected developed and emerging market countries

	Fiscal balance, as % of BDP (ESA 95)		Current account balance, as % of GDP	
	2010	2011[a]	2010	2011[a]
USA	–11.2	–10.0	–3.3	–4.0
EU	–6.4	–4.7	–0.9	–0.6
Germany	–3.3	–2.0	5.1	4.7
Italy	–4.6	–4.0	–4.2	–3.5
Portugal	–9.1	–5.9	–9.8	–7.5
Ireland	–32.4	–10.5	–0.7	1.2
Greece	–10.5	–9.5	–11.8	–8.3
Spain	–9.2	–6.3	–4.5	–4.1
Slovenia	–5.6	–5.8	–1.1	–1.4
Slovak R.	–7.9	–5.1	–2.9	2.8
Czech R.	–4.7	–4.4	–2.3	–2.5
Poland	–7.9	–5.8	–3.1	–4.1
Hungary	–4.2	1.6	1.7	1.6
Estonia	0.1	–0.6	2.8	1.8
Latvia	–7.7	–4.5	3.6	–0.3
Lithuania	–71.0	–5.5	1.8	0.2
Bulgaria	–3.2	–2.7	–1.5	–2.0
Romania	–6.4	–4.7	–4.2	–4.4
Croatia	–4.9	–5.6	–1.1	–1.9

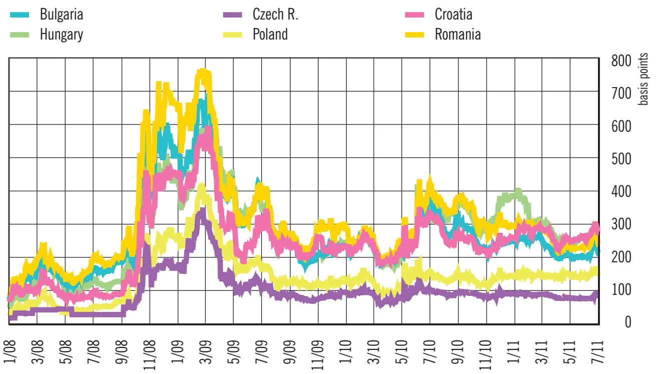
[a] Forecast.

Sources: European Commission, *European Economic Forecast*, spring 2011 and CNB (for Croatia).

A second group of countries calls for stronger supervision of imbalances and coordination of economic policies to ensure solvency of the member states. ESM funds would be used to help maintain liquidity through various forms of interventions in the debt market. This implies larger fiscal transfers within the eurozone and leads to stronger political and economic integration. In the final run, this would also be beneficial for countries with more orderly finances, which are more competitive and reap profits from the larger common market. This solution takes into account political risks associated with debt restructuring. The ECB is also in favour of this solution, as it would lower the risks to the monetary union that would emerge in case of a country or countries going bankrupt. Furthermore, it provides the ECB with a strategy to exit from its current role as supporter of the peripheral sovereign debt market and resume its main task of maintaining monetary stability.

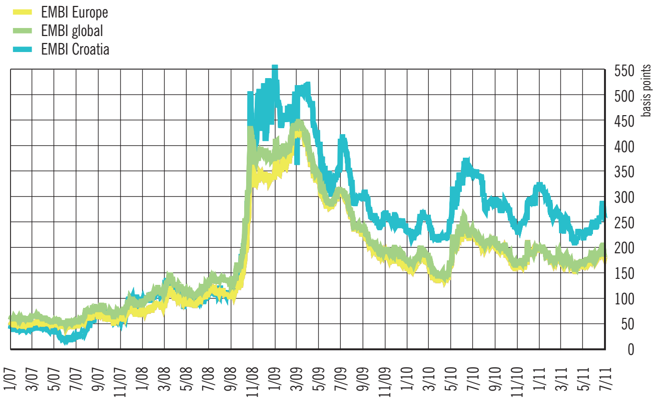
A solution to this dilemma is expected in July, when eurozone countries also decide on additional financial assistance to Greece. Without that, assistance to Greece would only postpone the solution of the basic dilemma until 2013 and in the meantime expose the eurozone to the risk of the crisis spread-

Figure 6 CDS spreads for 5-year bonds of selected emerging market countries



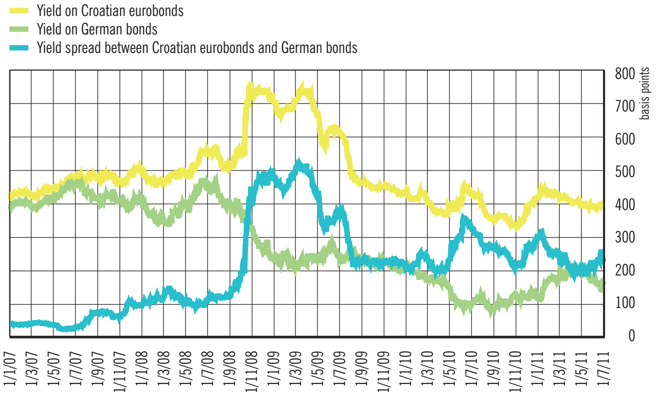
Source: Bloomberg.

Figure 7 EMBI spreads



Source: J. P. Morgan.

Figure 8 Yields on Croatian and benchmark German bonds maturing in 2014 and their spread



Source: Bloomberg.

Table 3 Public and external debt in selected European emerging market countries

as % of GDP

	Public debt		External debt
	2010	2011[a]	2010
Slovenia	38.0	42.8	114.3
Slovak R.	41.0	44.8	76.0
Portugal	93.0	101.7	231.5
Ireland	96.2	112.0	1,048.7
Greece	142.8	157.7	179.6
Spain	60.1	68.1	165.3
Czech R.	38.5	41.3	49.6
Poland	55.1	55.4	66.6
Hungary	80.2	75.2	158.6
Estonia	6.6	6.1	115.0
Latvia	44.7	48.2	165.0
Lithuania	38.2	40.7	85.8
Bulgaria	16.2	18.0	104.5
Romania	30.8	33.7	76.0
Croatia	41.2	43.6	101.1

[a] Forecast.
Sources: Eurostat; World Bank, *Quarterly External Debt Statistics* and CNB.

ing to other, larger, countries in the increased risk zone. This particularly refers to Spain, which has so far managed to stay outside the group of the most risky countries (Figure 4).

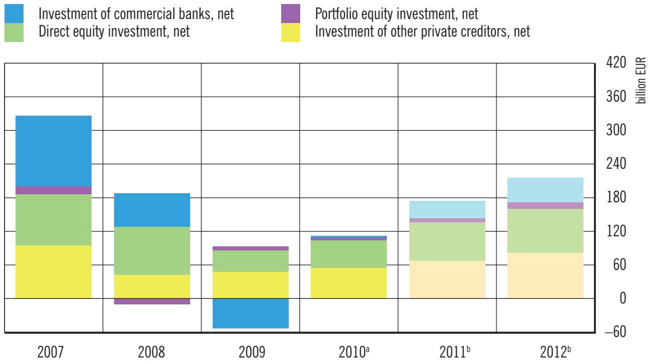
If ideas that do not exclude the option of restructuring eurozone sovereign debt prevail and if, accordingly, assistance to Greece includes some form of restructuring, problems could emerge in ECB's refinancing of Greek banks, which could lead to a banking, as well as economic and political crisis in Greece.

This scenario would raise the risk of spillover of the sovereign debt crisis to other large eurozone countries and the risk associated with the restructuring of the sovereign debt of the most vulnerable countries. In addition, it would increase the danger of a large-scale financial crisis and seriously threaten the survival of the European Monetary Union.

Sovereign debt restructuring for a larger number of countries would create considerable losses not only for local banks in the peripheral countries, which are significantly exposed to sovereign debt, but also for foreign banks from leading creditor countries. This could seriously threaten banking system stability and financing of economic recovery and, due to a negative feedback loop, additionally increase fiscal imbalances.

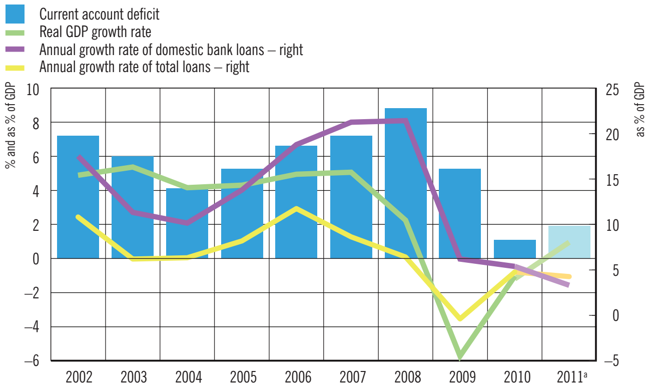
The level of this danger should be indicated by the results of stress tests for eurozone banking systems, which were carried

Figure 9 Capital inflows to European emerging market countries



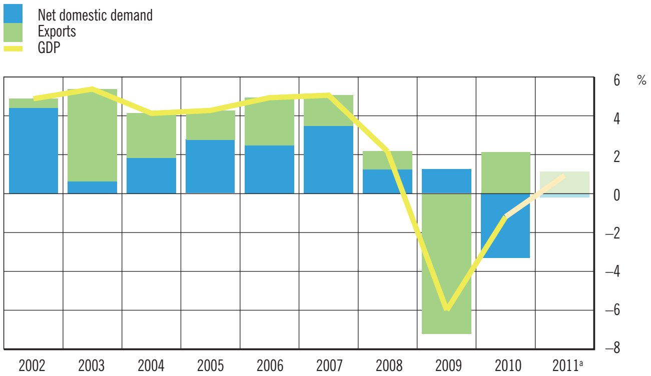
ª Estimate. ᵇ Forecast.
Sources: International Institute of Finance, *Capital Flows to Emerging Market Economies*, June 2011 and Bloomberg.

Figure 10 Foreign capital inflows and GDP growth in Croatia



ª Forecast.
Sources: CNB and CBS.

Figure 11 GDP growth pattern (contribution to growth)



ª Forecast.
Source: CBS.

out in March 2011 and coordinated by the European Banking Authority (EBA), but only if the shock scenario included the possibility of materialisation of risks associated with sovereign debt restructuring. Without that, the stress test results could hardly have a significant impact on market confidence.

It seems that even the countries supporting the restructuring option in principle are currently not in favour of that option in the case of Greece. They reckon that by 2013, when the ESM should become functional, banks will reduce their exposure to peripheral sovereign debt and thus mitigate potential losses, as well as reinforce their balance sheets by non-performing loan clean-up and capital increases. Thereby, they would also alleviate the unfavourable effects of these exposures on their own economies.

Apart from adversely affecting banking sector stability and the pace of eurozone economic recovery, the turbulence in the sovereign debt market for peripheral eurozone countries and a possible crisis escalation make the external environment of European emerging market economies a possible source of shocks and create a need to strengthen policies aimed at reducing external and internal imbalances.

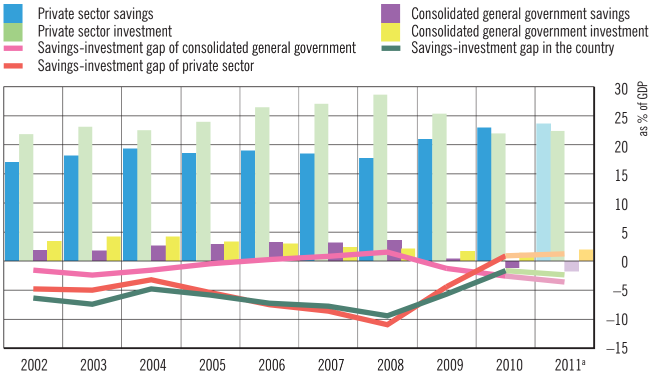
Risk premiums on sovereign debt of emerging market economies, measured in terms of spread, lowered to around 150 basis points in early 2010. However, the crisis in the market for the sovereign debt of peripheral eurozone countries in the remainder of 2010 and 2011 has increased volatility of spreads for European emerging market countries but has not led to their strong growth (Figure 7). This suggests that financial markets separate these countries from eurozone crisis countries because of their better fundamentals, primarily better indicators of economic growth and debt sustainability (Tables 1, 2 and 3). In such circumstances, capital inflows to these markets have begun to recover gradually, though at a slower pace compared with Asian and Latin American emerging markets, which record more dynamic rates of economic growth (Figure 9).

A fortunate circumstance is that most banks active in European emerging markets are not from the countries hit by the sovereign debt crisis, which reduces the possibility of crisis spillover through the banking channel. However, a possible spread of the crisis to a large number of countries could undermine the stability of parent banks and have a negative impact on their local subsidiaries in European emerging markets.

Among European emerging market countries, Croatia is in the group that has a somewhat higher risk premium (fluctuating between 200 and 300 basis points). Above all, this reflects a relatively more difficult process of redirecting the growth generator from domestic to export demand and the related slower economic recovery (Figures 7 and 8).

This process is hampered by slow restructuring of traditional industries and a business climate that is not stimulative enough because of institutional rigidities, primarily in the form of the oversized public sector and insufficiently flexible labour market.

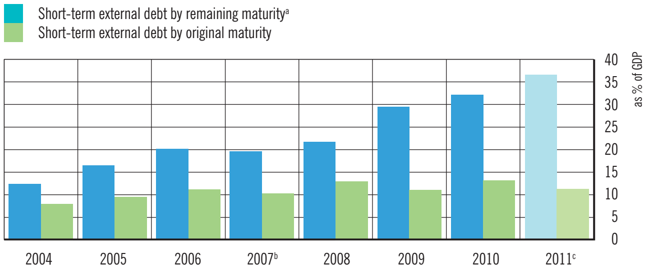
Figure 12 Savings and investment – total and by sector



ª Forecast.

Sources: MoF and CNB (estimate).

Figure 15 Short-term external debt

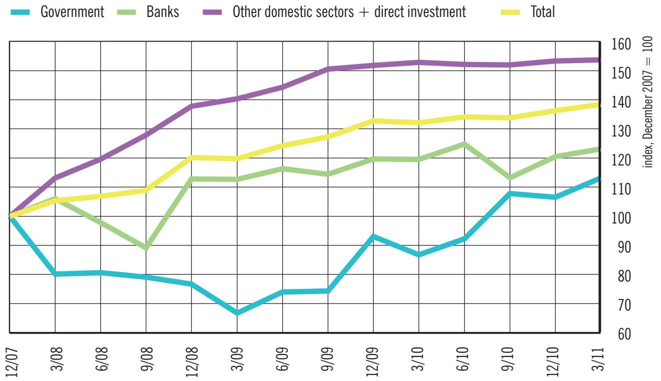


ª Short-term external debt by remaining maturity at the end of the current year is the sum of the balance of short-term debt at the end of the current year and long-term debt maturing in the next year. ᵇ Since end-2007, external debt has been calculated according to the new methodology. ᶜ Forecast.

Note: From 2008 on, short-term debt by remaining maturity includes round-tripping transactions which represent an accounting item that has a neutral effect. This item excluded, the debt maturing in 2011 would decrease by about 2 percentage points of GDP. For more details on round tripping, see *CNB Bulletin*, No. 154, Box 4 Round tripping and its impact on Croatian statistical data.

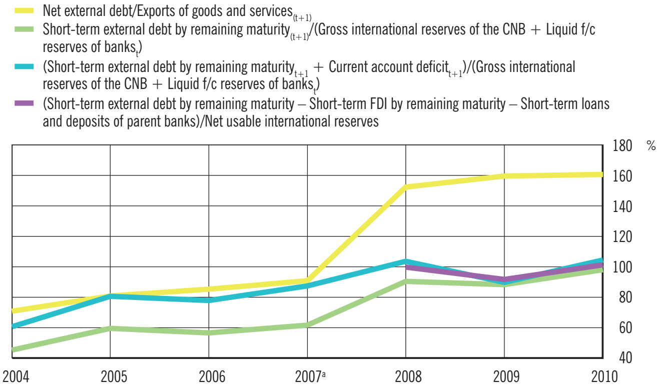
Source: CNB.

Figure 13 External debt by domestic institutional sector



Source: CNB.

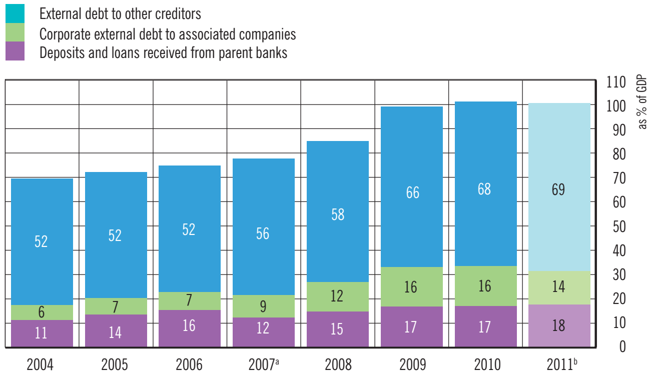
Figure 16 Selected indicators of external vulnerability



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

Source: CNB

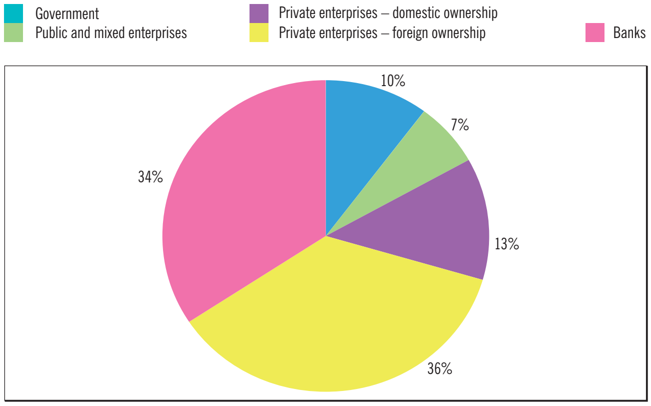
Figure 14 Total external debt by creditor



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

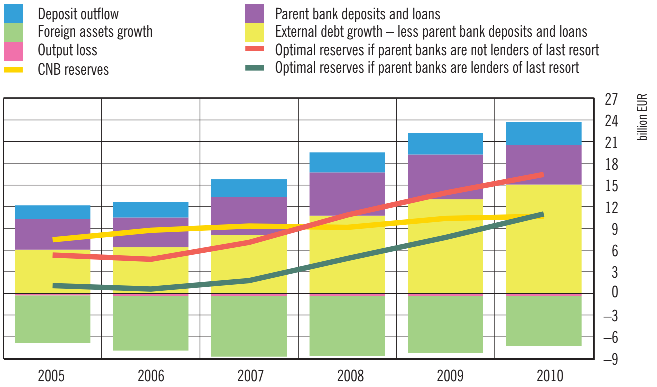
Source: CNB.

Figure 17 Projection of external debt principal payments in 2011 by sectors



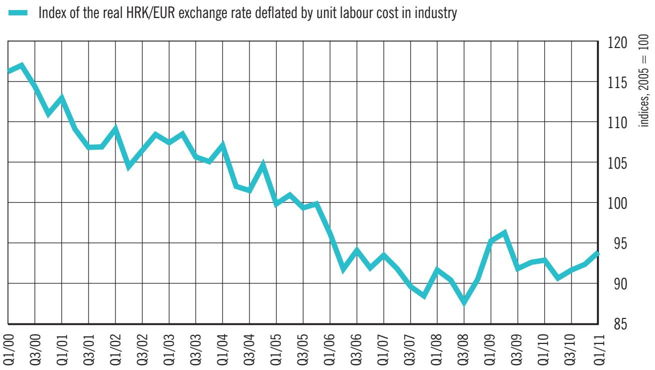
Source: CNB.

Figure 18 Optimal international reserves – contribution of individual components



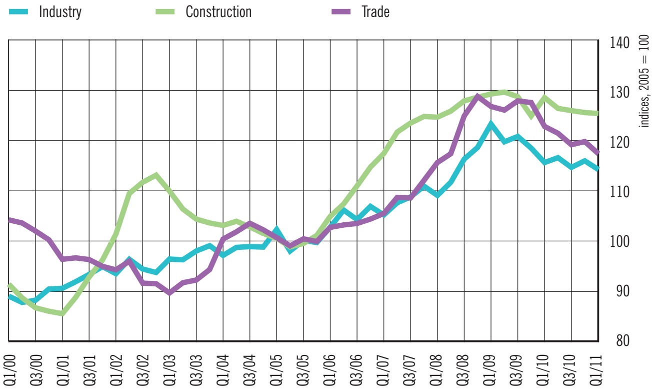
Source: CNB.

Figure 19 Real kuna/euro exchange rate



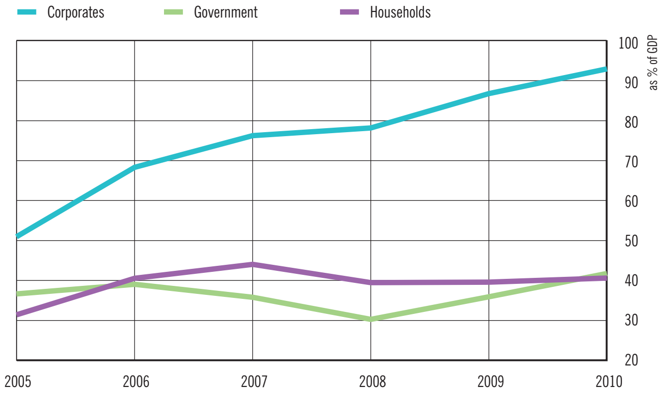
Note: A fall in the index indicates a real appreciation of the kuna against the euro.
Sources: CBS, CNB and CNB calculations.

Figure 20 Unit labour cost



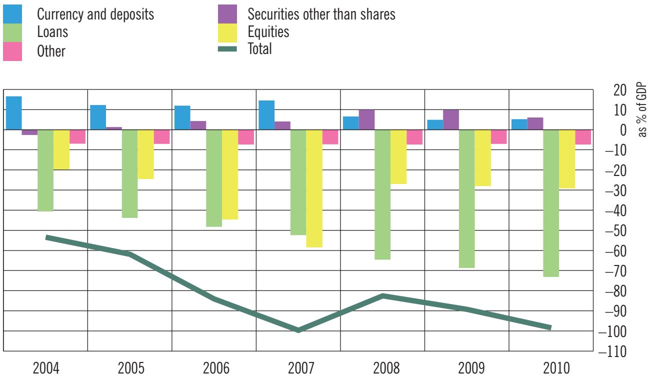
Sources: CBS, CNB and CNB calculations.

Figure 21 Total debt by sector



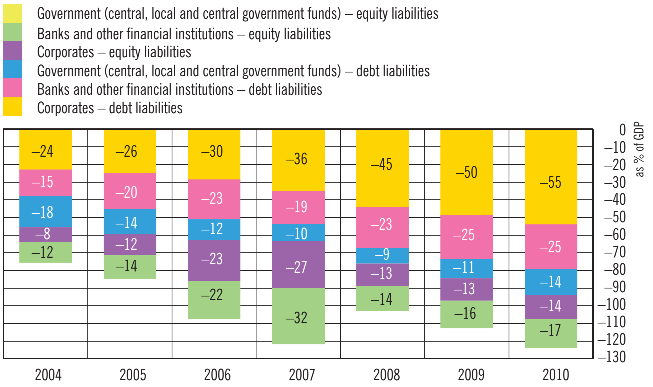
Source: CNB.

Figure 22 Net position of domestic sectors with respect to the rest of the world by instrument



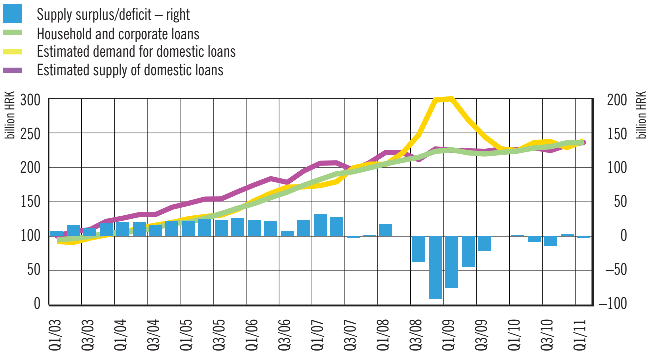
Source: CNB.

Figure 23 Net financial position of selected domestic sectors with respect to the rest of the world by equity and debt instrument



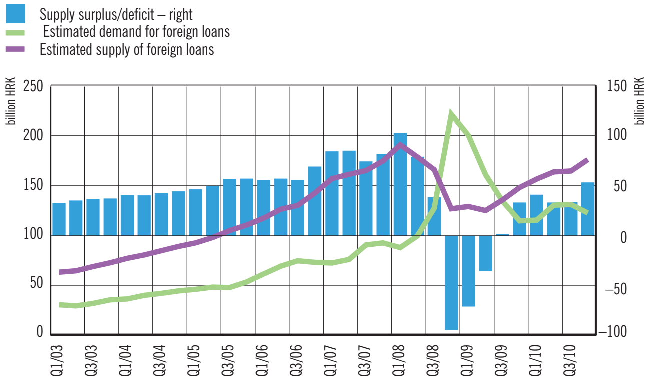
Source: CNB.

Figure 24 Estimated credit demand and supply in the domestic market[a]



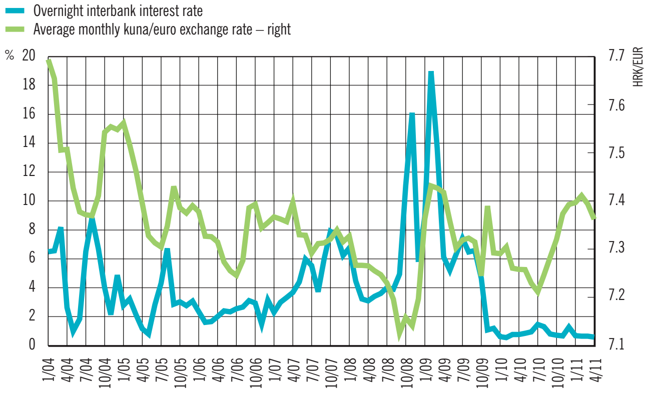
[a] Based on the results of the model used to estimate the impact of demand and supply on the Croatian credit market from Box 2 Credit market disequilibrium, *Financial Stability*, No. 5, July 2010.
Source: CNB calculations.

Figure 25 Estimated demand for and supply of foreign loans[a]



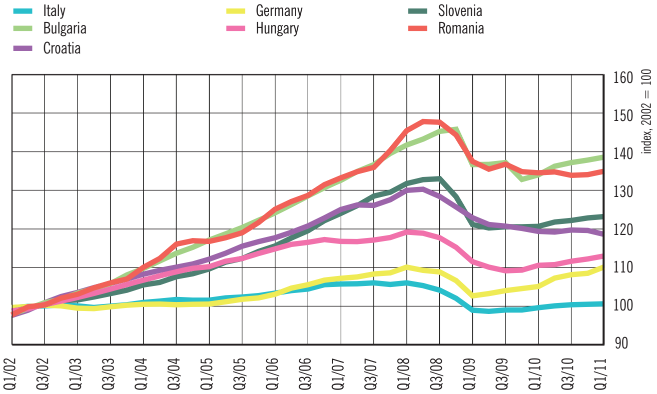
[a] See note under Figure 24.
Source: CNB calculations.

Figure 26 Kuna/euro exchange rate and overnight interest rates



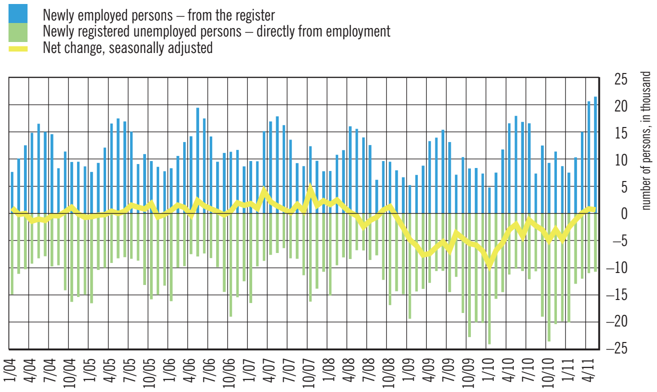
Source: CNB.

Figure 27 Gross domestic product, seasonally adjusted data in constant prices



Source: Eurostat.

Figure 28 Changes in employment registered with the Croatian Employment Service (CES)



Sources: CES and CNB calculations.

These processes will have to be accelerated within reforms imposed by the EU accession process (which is in its final stage) and because of financial market pressures, which have increased due to the turbulence in the eurozone sovereign debt market.

In light of the high degree of euroisation, exchange rate policy cannot be used to rebalance the economy as any exchange rate change would create considerable economic losses due to the materialisation of balance-sheet risks. Therefore, in addition to mentioned structural changes, economic policy should focus on fiscal adjustment to keep the budget deficit and public debt within acceptable boundaries. This should lower the country risk premium as well as the price of capital for entrepreneurs and create room for private investment growth without increasing external imbalances (Figure 12 and Box 2 The link between interest rates on corporate loans and country risk).

The implementation of these structural and fiscal adjustments implies a change in relative prices, i.e. the rise in factor income in the tradable sector relative to the non-tradable sector. This spurs a relatively faster growth in exports than in domestic demand, which enables a more dynamic overall economic growth and reduces external imbalances (Figures 19 and 20).

This process began in 2010 and continued into 2011 but at a relatively slow pace, due both to the inherent nature of the resource reallocation process and efforts of economic policy makers to avoid higher social and political tensions.

Owing to a sharp decrease in external imbalances thanks to private sector adjustment in the form of a major drop in domestic consumption and export growth, and an increase in the government sector deficit, the Croatian economy recorded a fall of 1.2% in 2010. GDP growth is expected to recover only mildly in 2011, to around 1%, with a slight increase in external and fiscal imbalances (Figures 10 and 11 and Tables 2 and 3).

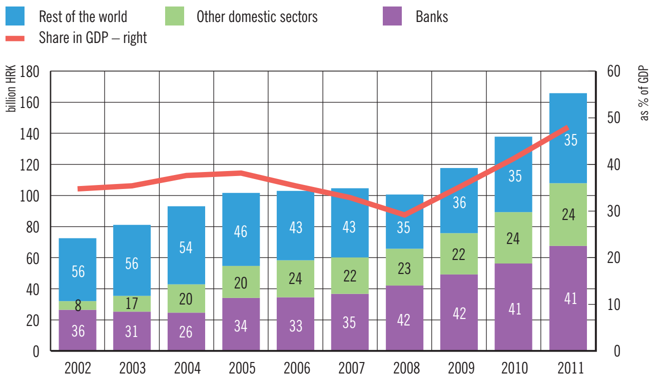
This strategy may be acceptable in the short run, that is, as long as external and internal imbalances remain moderate, economic activity stays well below potential and financial market confidence reflects changes unfolding within the EU accession process.

Notwithstanding relatively high indicators of external vulnerability (external debt maturing in the forthcoming period), market confidence is bolstered by relatively solid international reserves of the monetary system, which secure the country's external liquidity, and the fact that the bulk of short-term debt (by remaining maturity) relates to domestic banks' debt to parent banks and debt of foreign-owned corporates to their owners, which significantly lowers refinancing risk (Figures 13, 14, 15, 16, 17 and 18). Country risk is also reduced by the well-capitalised banking system, which ensures uninterrupted financing of the economy without creating a potential threat to public finance.

However, the absence of any more decisive implementation of structural reforms, which would reduce the country risk premium (as well as the price of capital, which is becoming increasingly important in view of the rise in eurozone interest rates) and speed up the reallocation of resources to tradable sectors, increases the probability of a long-term period of low growth rates. This scenario would result in higher insolvency risk, threaten financial market confidence and increase the economy's vulnerability to crisis spillover from international markets.

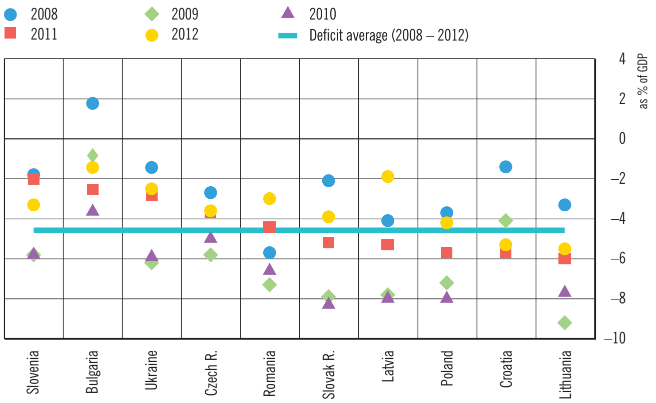
Government sector

Figure 29 General government debt



Sources: MoF and CNB.

Figure 30 General government deficit



Source: IMF, *Regional Economic Outlook 2011*.

A credible fiscal adjustment policy is needed to contain public debt growth so as to reduce the country risk premium and the price of capital in the country. This would speed up economic growth and in turn lower risks to long-term public debt sustainability.

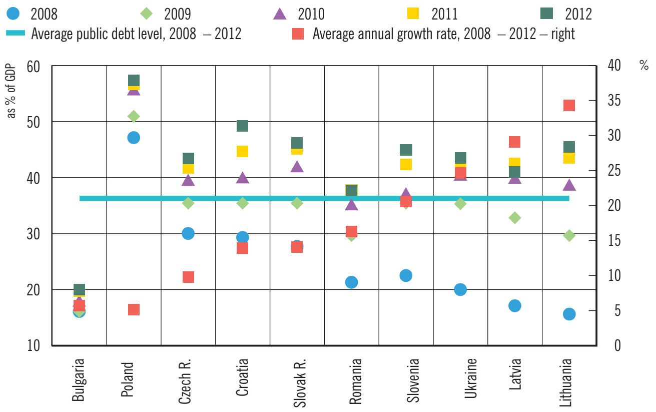
A dynamic increase in general government debt, which started after the eruption of the global financial crisis in 2008, has continued into 2011 (Figure 29). Such public debt developments were due to a major slump in Croatian economic activity caused by the financial crisis and global recession in 2009 and 2010. This led to the fall in tax revenues and the rise in fiscal deficit to over 5% of GDP in 2010. The deficit is expected to grow slightly in 2011 as well.

Similar trends in the fiscal sphere were evident in other European emerging market economies due to the same reasons, while the increase in fiscal deficits (Figure 30) and public debt (Figure 31) in most developed economies during the most recent crisis was also associated with support to troubled banks and anti-recessionary programmes involving higher fiscal expenditure.

Although public sector debt in emerging market economies is still much below that in developed economies, it has reached the level that increases the probability of solvency risk and requires the implementation of a fiscal consolidation policy (criteria to assess the level of insolvency risk determined by recent empirical research for emerging markets are given in Table 4).

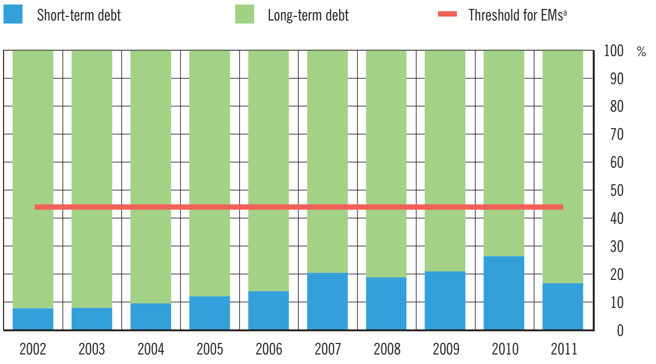
Risk premiums for these countries are still higher than before the crisis, but financial markets have not yet shown excessive concerns about their solvency since the ongoing economic recovery and expected solid growth in the forthcoming years secure long-term debt sustainability. Still, the crisis in the market for peripheral eurozone sovereign debt and its possible spillover

Figure 31 Public debt



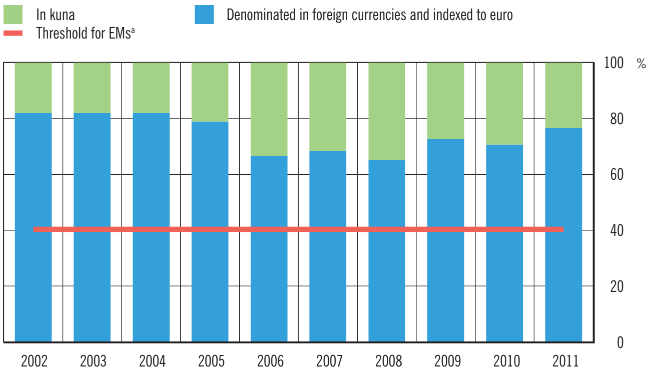
Source: IMF, *Regional Economic Outlook 2011*.

Figure 32 Breakdown of public debt by remaining maturity



[a] One of the indicators used for estimating the fiscal sustainability risk.
Sources: MoF and CNB.

Figure 33 Currency breakdown of public debt



[a] One of the indicators used for estimating the fiscal sustainability risk.
Sources: MoF and CNB.

Table 4 Thresholds of the fiscal sustainability risk indicator in 2011[a]

Indicator	Direction to be safe	Threshold	Observation for Croatia
$r - g^b$	<	1.1%	1.3%
General government public debt (as % of GDP)	<	42.8%	48.0%
Cyclically adjusted primary balance (as % of potential GDP)	>	–0.5%	–2.9%
Gross financing needs (as % of GDP)	<	20.6%	11.2%
Share of short-term debt as a ratio of total debt	<	44.0%	16.7%
Debt denominated in foreign currencies	<	40.3%	76.6%
Weighted average maturity of public debt (years)	>	2.3	5.9
Short-term external public debt (as percentage of international reserves)	<	61.8%	20.2%

[a] Baldacci E., I. Petrova, N. Belhocine , G. Dobrescu, and S. Mazraani: *Assessing Fiscal Stress*, IMF Working Paper, WP/11/100.
[b] Imputed interest rate on general government debt, deflated by the GDP deflator (5-year average), minus real GDP growth rate (5-year average).
Sources: MMF WP/11/100 and CNB.

to other markets increase the need for fiscal adjustment in European emerging market countries.

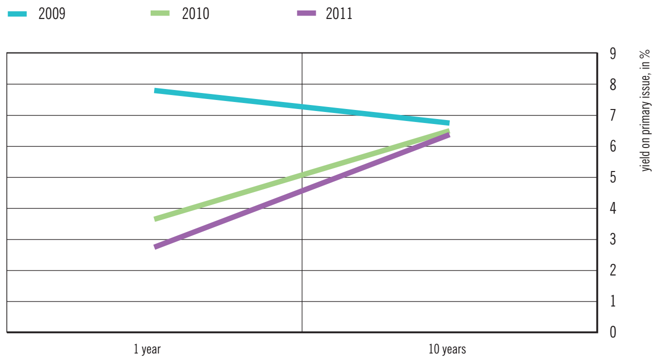
Against this background, Croatia's slower exit from recession, which is expected in 2011, makes fiscal adjustment necessary to bolster financial market confidence in the country's solvency. This is also the precondition for lower risk premiums and price of capital, as well as more dynamic growth, with a positive feedback on the reduction of solvency risk.

The assessed level of general government debt at end-2011, which draws on official fiscal projections, has already reached a point that signals increased solvency risk. Therefore, it is crucial to secure stabilisation of the debt level in the medium run by the implementation of the Fiscal Responsibility Act (FRA, OG 139/2010).

Overall financing needs in 2011 are slightly larger than in 2010, but are much below the threshold, measured as the share in GDP (Figure 37), which indicates increased financing risks. Government financing in 2011 has so far progressed without difficulties, with slightly more lenient conditions than last year. In March 2011, the central government issued USD 1.5bn worth of bonds in the US market (converted to euro) and plans a new issue of eurobonds in July. In the meantime, the government raised a short-term debt from domestic banks to bridge the time gap between the repayment of matured external debt and inflows from new bond issues.

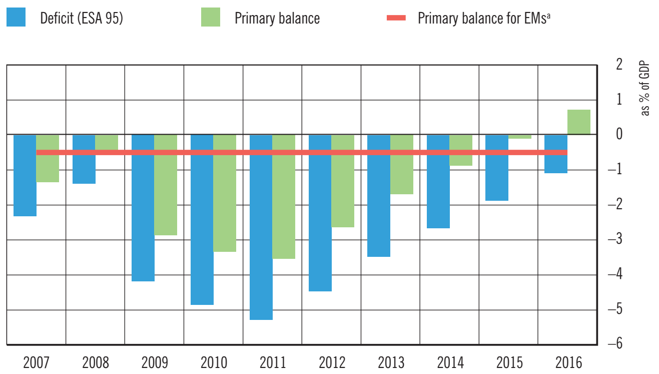
Following the crisis, the yield on short-term euro securities dropped markedly, from 7.8% in 2009 to 2.75% on the primary

Figure 34 Yield on primary issue of euro securities



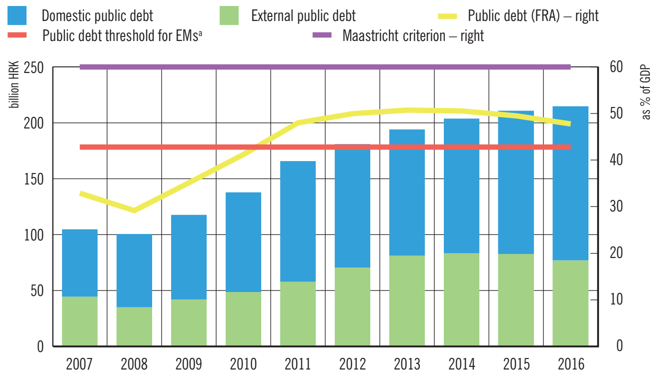
Source: MoF.

Figure 35 Projection of general government deficit



[a] One of the indicators used for estimating estimating the fiscal sustainability risk.
Sources: MoF and CNB.

Figure 36 Projection of general government debt



[a] One of the indicators used for estimating the fiscal sustainability risk.
Sources: MoF and CNB.

issue (Figure 34). This is the result of abundant bank liquidity and entry of foreign investors to the market for short-term sovereign debt. By contrast, as regards long-term-borrowing, there were no major changes in coupons on the primary issue until the beginning of 2011, as fundamental factors did not change significantly. The second quarter of 2011 witnessed a slight fall in yields on bonds; at end-May, yields to maturity dropped to around 5.8% on almost all maturities in 2019 and 2020. This was the result of persistently low interest rates and yields on developed markets and expectations that Croatia's EU accession negotiations would soon be concluded.

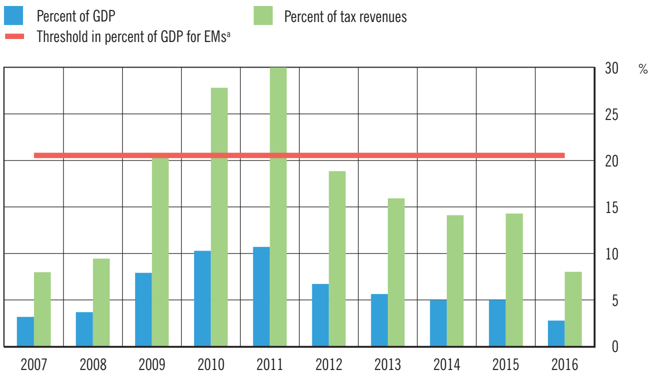
Government foreign borrowing will keep the share of external debt in total debt relatively high (37%). Coupled with a significant share of debt to residents that is denominated in or linked to foreign currency, the share of total debt exposed to currency risk will be as high as 75% (Figure 33). This necessitates a relative increase in non-indexed domestic currency borrowing in the forthcoming years so as to ensure the formation of the domestic yield curve, which is necessary to meet the criterion of interest rate convergence for Croatia's entry to the eurozone. In this context, the second half of 2011 is expected to see an issue of kuna bonds maturing in 2016 or 2017, when there are no major maturities.

The sectoral structure of public debt shows considerable bank exposure to the government so that public finance stability is also important for financial stability (Figure 29). At the same time, the stability of the Croatian banking sector lowers the risk of public debt growth. Significant exposure to public debt is also recorded by pension funds. Still, as savings accumulated in these funds were formed by redirection of some budget revenues, this portion of the public debt is associated with the pension system reform, which mitigates the risk of implicit claims arising from pensions and has a stabilising effect on public debt sustainability.

As regards the mentioned indicators of fiscal vulnerability and solvency risks for emerging markets, the share of Croatian public debt maturing within a year is around 20%, which is significantly below the threshold of 44% (Figure 32). By contrast, indicator of the currency structure of Croatian public debt is above the threshold of 40.3% (Figure 33), which suggests that the stated exchange rate risk is a bigger problem than the refinancing risk. Exchange rate risk is also associated with significant external vulnerabilities in the form of high external (particularly short-term) debt, whose coverage by international reserves lags behind the threshold for high fiscal stress assessed for emerging markets.

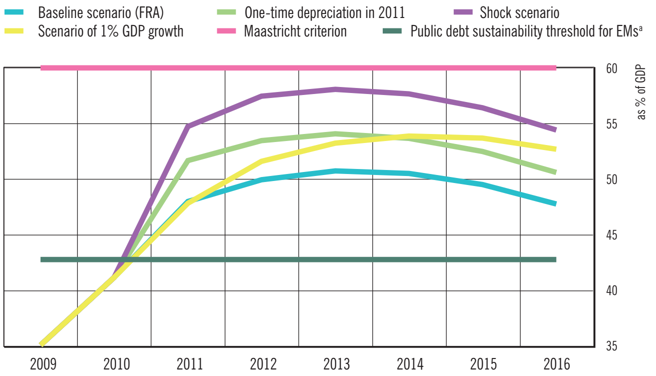
In view of relatively high external and fiscal vulnerabilities, the strengthening of financial market confidence in the country's solvency will depend on the implementation of a credible fiscal consolidation policy and structural changes that must ensure enhanced competitiveness and more dynamic growth, while reducing external debt.

Figure 37 Gross financing needs



a One of the indicators used for estimating the fiscal sustainability risk.
Sources: MoF and CNB.

Figure 38 Projection of public debt under various scenarios



a One of the indicators used for estimating the fiscal sustainability risk.
Source: CNB.

Analysis of public debt sustainability and stress sensitivity

To assess the impact of the Fiscal Responsibility Act (FRA) on public debt developments in the medium run, i.e. to examine whether this consolidation policy increases the level of public finance sustainability, an approximate projection of public debt movements from 2012 to 2016 was made based on the assessed outcome in 2011. In addition to assumptions underlying the FRA, which envisages a reduction in expenditures by 1% of GDP annually until the primary fiscal balance of the general government equals zero or turns positive in nominal terms, the projection includes macroeconomic assumptions on the average GDP growth rate and the average inflation rate from 2012 onward based on their ten-year averages (2001-2010) of 2.7% and 2.8%, respectively.

It is assumed that current budget revenues will grow at an annual rate of inflation increased by 3/4 of the real GDP growth rate, which would gradually and slightly reduce the tax burden in terms of the share in GDP (Figure 35). It is also assumed that, as part of harmonisation with competition regulations in the EU, public debt will by the end of 2011 include liabilities arising from guarantees to shipyards, of around 3.3% of GDP (Figure 36).

In view of the sectoral structure of borrowing in the projected period, it is expected that the bulk of the new public debt will be raised in the domestic financial market, with a dominant participation of pension funds, while maturing external debt will be refinanced in the foreign market.

Under these assumptions, preliminary fiscal projections indicate that the primary balance of the general government budget will record a surplus in 2016 of some 0.7% of GDP, while the overall fiscal deficit of the general government will be around 1.1% of GDP, according to ESA 95 methodology (Figure 35). Stabilisation of the public debt-to-GDP ratio, which is the main condition for reducing risks to public sector solvency, will be achieved in 2013, after which the debt-to-GDP ratio will decrease.

The problem of this scenario is evident in the fact that public debt is stabilised at slightly above 50% of GDP. According to the mentioned fiscal stress indicators, this signals increased insolvency risk, which means that fiscal consolidation should be more powerful than envisaged in the FRA-based scenario.

This is also suggested by stress test results showing considerable sensitivity of the debt level to shocks in the form of highly unlikely but plausible scenarios, such as the resurgence of the crisis coupled with a decrease in GDP and exchange rate depreciation, or a one-off major change in the exchange rate, and the scenario of a prolonged recession (Figure 38). All these scenarios considerably raise the public debt level above the sustainability threshold for peer countries and indicate a need to build up buffers to amortise shocks in the form of larger primary surpluses than that envisaged in the FRA-based baseline scenario.

Box 1 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. In addition to showing 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.

Table 1 Inter-sector claims and liabilities at end-2009 and end-2010

as % of GDP

Liabilities		Claims												Total liabilities	
		Domestic sectors										Rest of the world			
		Corporates		Financial sector		General government		Households		Total					
		2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
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	40	43	0	0	0	0	40	43	43	47	83	90
	Shares and equity	39	39	3	3	26	26	17	17	85	86	24	25	109	111
	Insurance technical provisions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other claims and liabilities	29	29	1	1	6	6	2	2	38	38	10	10	48	48
	Total	68	68	46	49	32	32	19	20	165	169	79	83	244	252
Financial sector	Monetary gold and SDRs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Currency and deposits	14	15	19	19	3	3	50	53	86	89	14	14	100	104
	Securities other than shares	0	0	0	0	0	0	0	0	0	0	2	3	2	3
	Loans	0	0	7	7	0	0	0	0	7	7	24	23	31	30
	Shares and equity	2	1	2	2	9	9	4	4	16	17	18	19	34	36
	Insurance technical provisions	1	1	1	1	0	0	13	16	15	18	0	0	15	18
	Other claims and liabilities	1	1	1	0	0	0	1	1	4	3	0	1	4	4
	Total	18	18	29	29	12	13	68	75	127	135	59	59	186	194
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	18	20	0	0	0	0	18	20	8	10	25	30
	Loans	0	0	7	8	0	0	0	0	7	8	3	4	10	11
	Shares and equity	0	0	0	0	27	30	0	0	27	30	0	0	27	30
	Insurance technical provisions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other claims and liabilities	4	4	0	0	0	0	0	0	4	4	0	0	4	4
	Total	4	4	25	27	27	30	0	0	56	61	11	14	67	75
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	39	40	0	0	0	0	39	40	1	0	39	41
	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	40	41	0	0	0	0	40	41	1	0	41	42
Rest of the world	Monetary gold and SDRs	0	0	1	1	0	0	0	0	1	1	0	0	1	1
	Currency and deposits	0	0	15	16	0	0	3	3	18	19	0	0	18	19
	Securities other than shares	0	0	21	20	0	0	0	0	21	20	0	0	21	20
	Loans	0	0	1	1	0	0	0	0	1	1	0	0	1	1
	Shares and equity	8	11	2	3	0	0	0	0	10	14	0	0	10	14
	Insurance technical provisions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other claims and liabilities	3	3	0	0	0	0	0	0	4	4	0	0	4	4
	Total	12	14	40	42	0	0	3	3	55	59	0	0	55	59
Total	Monetary gold and SDRs	0	0	1	1	0	0	0	0	1	1	0	0	1	1
	Currency and deposits	14	15	35	35	3	3	53	56	104	108	14	14	118	123
	Securities other than shares	0	0	41	42	0	0	0	0	41	42	11	14	52	57
	Loans	0	0	93	98	0	0	0	0	93	98	71	74	165	172
	Shares and equity	49	51	7	9	62	65	21	21	139	147	42	43	180	190
	Insurance technical provisions	1	1	1	1	0	0	13	16	15	18	0	0	15	18
	Other claims and liabilities	37	37	4	3	6	6	3	4	50	49	11	11	61	60
	Total	101	104	180	188	71	74	90	98	443	464	149	157	592	622

Source: CNB.

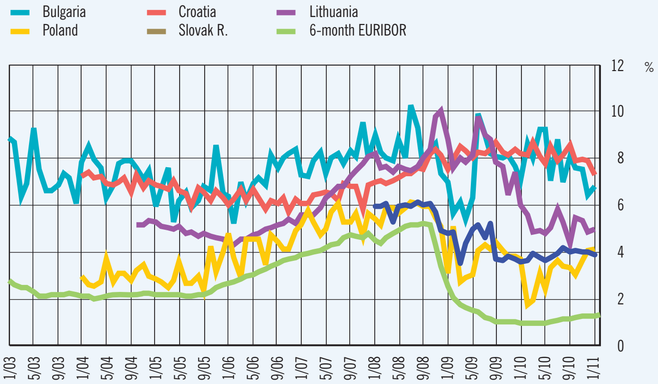
Box 2 The link between interest rates on corporate loans and country risk

Funding cost has a significant impact on the investment level and capital allocation and thus in turn on growth potential and the direction of economic activity. However, it is difficult for small and open economies exposed to high and volatile capital flows to influence the level of domestic interest rates in order to adjust them to the current phase of the domestic economic cycle. In the case of Croatia, the reduction of interest rates and their gradual convergence towards the prevailing level of eurozone interest rates in the pre-crisis period contributed to the surge in domestic sectors' debt, the ballooning of various asset prices and the expansion of the non-tradable sector of the economy. On the other hand, the fact that interest rates surged and remained at high levels after the outbreak of the crisis has often been related to the slow pace of recovery and banks' difficulties with loan repayment performance.

The level of the interest rate on corporate loans reflects the cost of funding sources for the bank and risk assessment of a specific enterprise, which also depends on the riskiness of its business environment and the bank's business strategy. Country risk is a very important determinant of the environment in emerging market countries such as Croatia, where shifts in investor risk appetite or a downgrade in the country's credit rating can result in the widening of yield spreads on government bonds and thus considerably influence the price of capital for the private sector, including banks.[1] The research on the funding costs for the private sector in emerging market countries therefore very often refers to the phenomenon of credit ceiling, i.e. the fact that the country's credit rating in most cases determines the highest possible credit rating of enterprises and, consequently, their borrowing cost.[2] This research aims to find out to what extent the country risk premium affected the formation of interest rates on corporate loans by banks in CEE countries immediately before and after the outbreak of the global financial crisis.

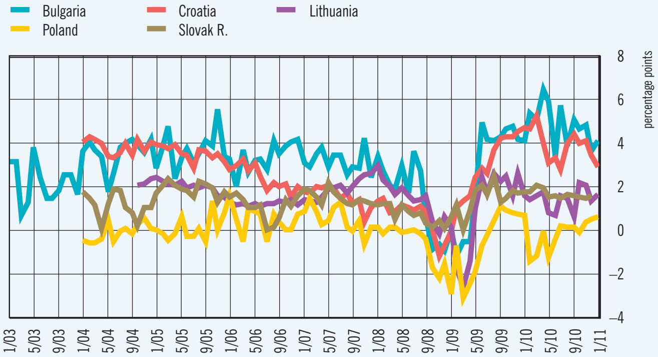
In spite of the importance of corporate borrowing conditions for economic activity and, in turn, for financial system stability, this area has not been researched extensively, possibly due to the low availability of consistent and comparable data series on interest rates on corporate domestic and foreign borrowing in various countries. This analysis used interest rates charged by domestic banks on foreign currency and foreign currency-indexed loans with original maturity of up to one year (Bulgaria, Croatia) or with a one-year fixed interest rate (Lithuania, Poland, Slovakia), in order to eliminate, to the largest extent possible, the effect that differences in exchange rate regimes have on domestic currency interest rates and alleviate the effect of different maturities. The selection of countries and length of the observed period are determined by the availability of data. Data on interest rate trends for most countries cover the period from 2004 to 2011. As interest rate levels are not fully comparable due to methodological differences in the collection of interest rate statistics, the analysis focused on interest rate changes in individual countries and their link with benchmark interest rates and the country risk premium.

Figure 1 Interest rates on f/c denominated loans to corporates



Source: Central banks of observed countries.

Figure 2 Spread between interest rates on corporate loans and 6-month EURIBOR increased by the yield spread on government bonds



Sources: Central banks of observed countries, Merrill Lynch, Bloomberg and CNB calculations.

In the period before the escalation of the financial crisis, interest rates on foreign currency corporate loans mainly followed EURIBOR movements (Figure 1), with the result that the interest spread on corporate loans, calculated as the difference between the interest rate on foreign currency corporate loans and the cost of foreign capital (the sum of the country risk premium measured by the yield spread between government bonds and benchmark German bonds and the six month EURIBOR) was relatively stable (Figure 2). The escalation of the financial crisis in the second half of 2008 led to a sharp decrease in the EURIBOR, but also to a significant increase in the country risk premium for all of the observed countries, which pushed up the cost of foreign funding. However, at the peak of the crisis banks passed on only part of this increase to interest rates on corporate loans, so that the observed interest spread narrowed considerably. Banks probably failed to react more strongly at the time due to fast premium growth and their assessing the shock as temporary,

---

[1] S. Agca and O. Celasun: *How Does Public External Debt Affect Corporate Borrowing Costs in Emerging Markets*, IMF Working Paper 09/26.

[2] E. Borensztein, K. Cowan and P. Valenzuela: *Sovereign Ceilings 'Lite'? The Impact of Sovereign Ratings on Corporate Ratings in Emerging Market Economies*, IMF Working Paper 07/75.

Table 1 Unit root tests

Country	Series' level		Conclusion
	t-statistics	Critical value (5%)	
Bulgaria	–2.902	–2.892	Stationarity in the series' level
Croatia	–5.809	–4.800	Stationarity with a structural break in the series' level
Lithuania	–3.050	–2.901	Stationarity in the series' level
Poland	–3.009	–2.897	Stationarity in the series' level
Slovak R.	–4.191	–2.897	Stationarity in the series' level

Note: The hypothesis H_0 in the observed tests assumes that the time series is not stationary and that there is a unit root problem, while the alternative hypothesis assumes the stationarity in the series' level. The stationarity was checked using the ADF tests, whereas, in case of Croatia, the Zivot-Andrew test was also used. In the ADF test, the critical values of tests for the significance level of 5% were taken from MacKinnon, J. G. (1996): *Numerical Distribution Functions for Unit Root and Cointegration Tests*, Journal of Applied Econometrics, 11, pp. 601–618, while in the Zivot-Andrew test the critical value was taken from Zivot E., and D. Andrews (1992): *Further Evidence of Great Crash, the Oil Price Shock and Unit Root Hypothesis*, Journal of Business and Economic Statistics, 10, pp. 251–270. If t-statistics is lower than the critical value, the hypothesis H_0 is rejected.
Source: CNB calculations.

compensating this by increased credit rationing.[3] Once financial markets had stabilised, a decrease in the country risk premium for the observed countries caused the interest spread on corporate loans to rebound to pre-crisis levels, with the exception of Bulgaria and, especially, Croatia, where the spread widened.

The stability of the interest spread, that is, of the link between interest rates on foreign currency corporate loans and the marginal cost of funding on the international market, was formally tested by unit root tests. These tests provided an econometric assessment of the stationarity of the difference between the two series, the presence of which statistically proves the stability of the link between them.[4] Augmented Dickey-Fuller (ADF) tests for the presence of the unit root actually show that the link between the two series is stable in all of the observed countries except in Croatia (Table 1). As ADF tests may mistakenly lead to the conclusion that the unit root exists in the presence of the structural break, the stationarity of the interest spread in Croatia was further tested by the Zivot-Andrews test. This test confirms the stability of the link between the two interest rate series, as it detects structural break in it early in 2009, after which the interest spread stabilised at an increased level, although showing a tendency to decrease at the end of the period. This also provides statistical proof that the interest spread on corporate loans in Croatia widened in the post-crisis period compared to the period before the crisis, which calls for further research. Preliminarily, the reasons for these trends can be traced to low interest rate policy, partly due to the underestimation of risk, pursued under conditions of high availability of relatively cheap foreign capital in the pre-crisis period and to a significant change in risk perception in the post-crisis period, brought about by the extended recession, as well as to an increase in the cost of domestic funding sources, reduced bank profitability, slow growth of total loans and lower availability of foreign capital.

The obtained results point to a relatively stable link between interest rates on foreign currency corporate loans in the observed CEE countries, the benchmark European interest rate and the country risk premium in the international market. In other words, the factors determining the country risk premium also influence the cost of corporate borrowing. Notwithstanding the high volatility of the country risk premium in the international market and its partial dependence on global market sentiment, the research on the determinants of this premium in emerging economy countries shows that it also depends on country-specific fundamental indicators, especially on the indicators of fiscal imbalance and external vulnerability.[5] The improvement of the fiscal position and reduction of the external imbalance could therefore spur economic growth and thus produce a positive impact on fiscal sustainability and the country's financial stability.

---

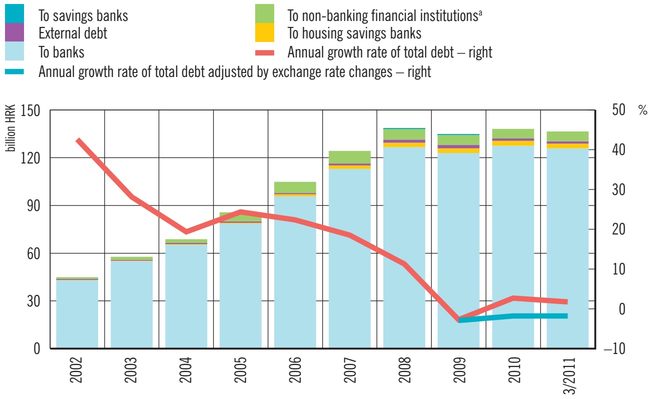
3 A. Čeh, M. Dumičić and I. Krznar: *Model neravnoteže na tržištu kredita i razdoblje kreditnog loma*, I–30, January 2011.

4 A similar methodology was used in M. G. Arghyrou, A. Gregoriou and A. Kontonikas: *Do real interest rates converge? Evidence from the EU*, Journal of International Financial Markets, Institutions and Money Volume 19, Issue 3, 2009, pp. 447-460.

5 E. Baldacci and M.S. Kumar: *Fiscal Deficits, Public Debt, and Sovereign Bond Yields*, IMF Working Paper 10/184; I. Alexopoulou, I. Bunda and A. Ferrando, *Determinants of government bond spreads in new EU countries*, ECB Working Paper Series, No. 1101, 2009.

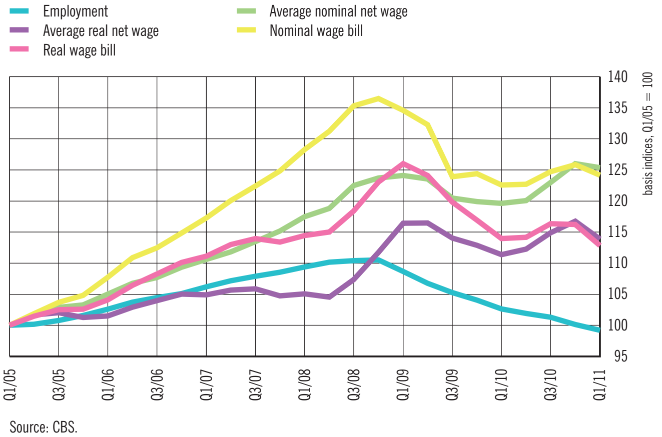
Household sector

Figure 39 Household debt



[a] Data on household debt to leasing companies and insurance companies are based on estimates.
Sources: CNB and HANFA.

Figure 40 Employment and wages (seasonally adjusted)



Source: CBS.

Most household debt indicators improved in late 2010 and early 2011. This tendency could continue in the remainder of 2011 thanks to the expected increase in household income and somewhat slower growth in household borrowing. However, the steadily rising unemployment risk coupled with a high interest rate and currency exposure could create difficulties in servicing existing loans.

In late 2010 and early 2011, households continued to deleverage, so their total debt, excluding the exchange rate effects, decreased effectively at the annual rate of –0.8% at the end of the first quarter of 2011. However, the slight weakening of the kuna against the euro and the strong increase in the exchange rate of the Swiss franc, the currencies to which most household loans are indexed, accelerated the annual growth rate of the nominal household debt to 2.8% in late 2010, while a partial reversal of the exchange rate trend in the first quarter of 2011 slowed down this annual growth rate to 1.8% (Figure 39).

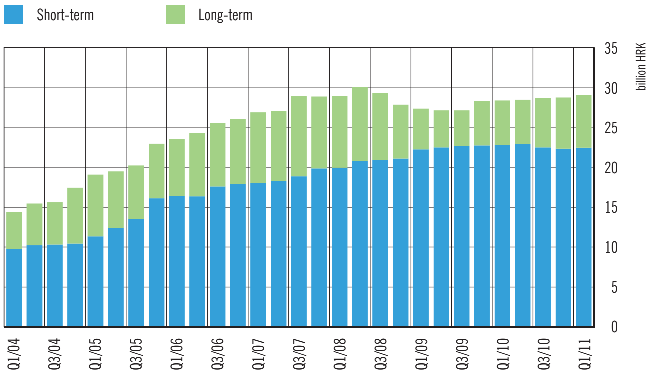
Although the changes in income tax legislation carried out in mid-2010 and the repeal of the higher special (crisis) tax rate in late 2010 temporarily increased household disposable income (Figure 40), the steady fall in employment, which has lasted for more than two years, coupled with the continued wage decrease in early 2011, discouraged households from new borrowing (Figure 41). However, a possible recovery in overall household disposable income and the continued slight downward movement in interest rates over 2011 will not prompt substantial borrowing by households due to uncertainties associated with the persistent rise in unemployment.

Households have slackened the process of deleveraging, as witnessed by increasingly vigorous new borrowing. Household demand for new loans in late 2010 and early 2011 was directed mostly towards long-term loans, the interest rates on which have been on a slight downward trend since early 2010 (Figures 41 and 42). The recovery in household loans has again been mostly attributable to the rise in the amount of newly-granted other long-term loans (e.g. cash any-purpose loans), although they were stagnant in early 2011. Notwithstanding a slight increase in newly-granted amounts of housing loans, their year-on-year rate of growth slowed down in the first quarter of 2011 due to the slight appreciation of the kuna against the Swiss franc (Figure 43). Newly-granted credit card and car loans increased in the same period for the first time since the escalation of the financial crisis, while the share of mortgage loans in newly-granted loans has been steadily falling since the outbreak of the crisis.

Due to the significant weakening of the kuna against the Swiss franc and its slight weakening against the euro, the increase in the nominal amount of household debt worsened household debt indicators in late 2010, when the ratio of household debt to annual disposable income[1] reached a historical high. This indicator somewhat improved in the first quarter of 2011 (Figure 44). Most other indicators of household debt improved in the period under review. The steady increase in household bank savings lowered the household debt-to-deposit ratio in early 2011 to its mid-2005 level. The ratio of household debt to liquid financial assets[2] has also steadily improved due to favourable trends in the domestic capital market, which added to the increase in the value of household assets held in investment and pension funds (Figure 45). The ratio of interest payments to household disposable income was stable in the observed period due to the downward tendency of interest rates on household loans. Household debt indicators could continue to improve in the remainder of 2011 under the impact of the expected slight increase in household disposable income and an only marginal recovery in household borrowing.

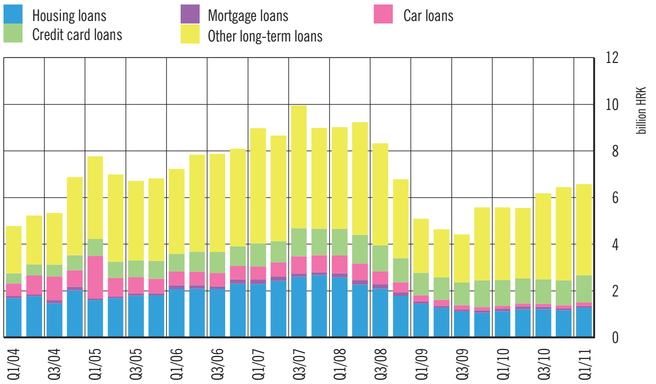
Exposure of households to the risk of increased debt burden due to exchange rate movements remained high in early 2011 due to heavier reliance on long-term borrowing, while household exposure to interest rate risk was also traditionally high. The share of exchange rate-indexed loans in total loans, which has been on a steady upward trend ever since the onset of the financial crisis in late 2008 (Figure 46), grew to almost 75% in late March 2011. The share of loans with interest rates variable within a year somewhat decreased (91% of all loans at the end of March 2011), while the average period in which interest rates are variable within a year slightly lengthened (Figure 47). Exposure of households to interest and exchange rate risk will remain high in the remainder of 2011.

Figure 41 Maturity breakdown of newly-granted household loans, adjusted by seasonal fluctuations



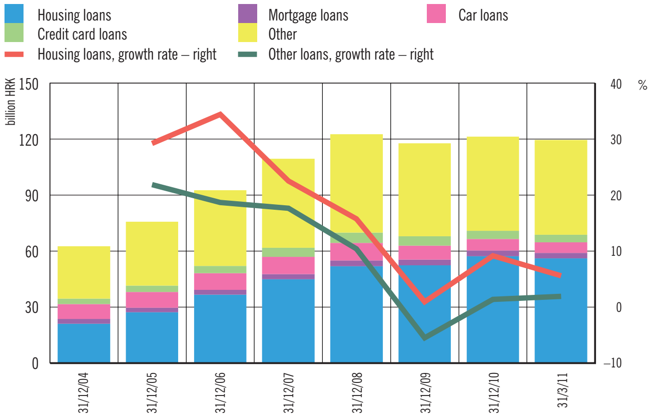
Source: CNB.

Figure 42 Newly-granted long-term household loans by purpose, adjusted by seasonal fluctuations



Source: CNB.

Figure 43 Household loans by purpose



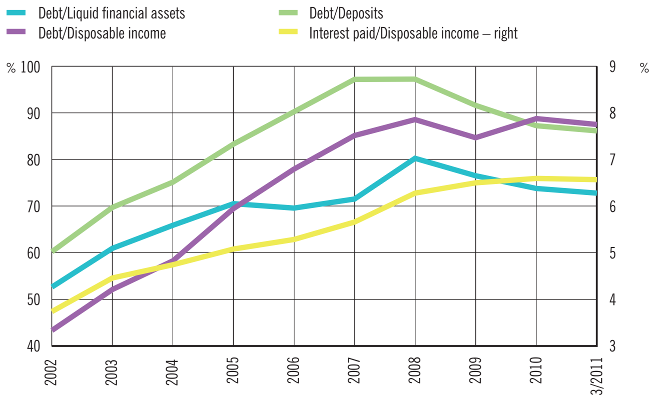
Source: CNB.

---

[1] Estimated disposable income of households does not include some forms of income generated in the official economy (e.g. royalties, temporary service contracts and income from capital) or income from the unofficial economy (grey economy).

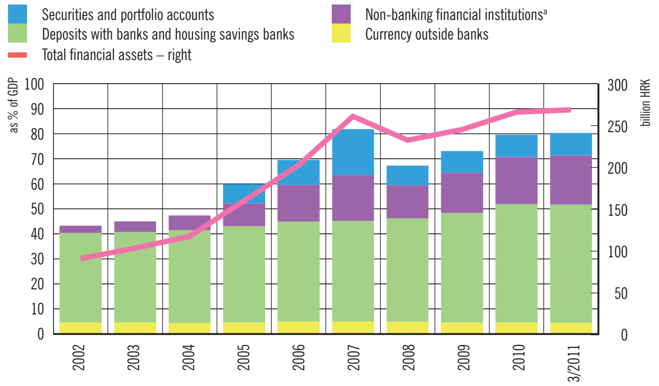
[2] Household financial assets exclude foreign cash and deposits with foreign banks since their level cannot be precisely estimated.

Figure 44 Household debt and debt burden



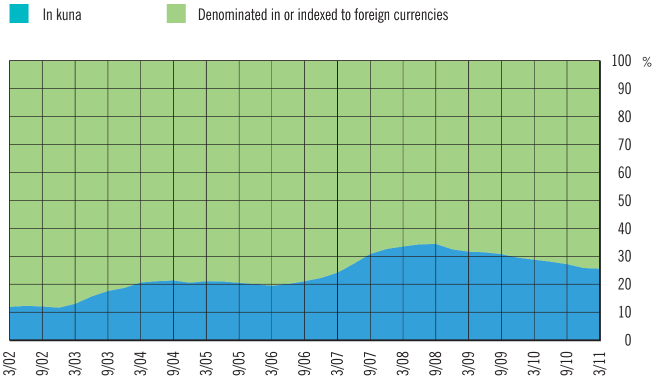
Sources: CNB, HANFA and CDCC.

Figure 45 Household financial assets



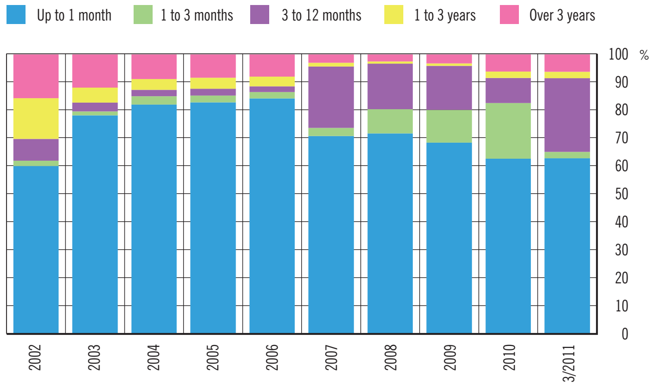
[a] Data on household claims against open-end and closed-end investment funds and data on claims against insurance companies are based on estimates.
Sources: CNB, HANFA and CDCC.

Figure 46 Currency breakdown of household loans



Izvor: HNB

Figure 47 Household loans by interest rate variability



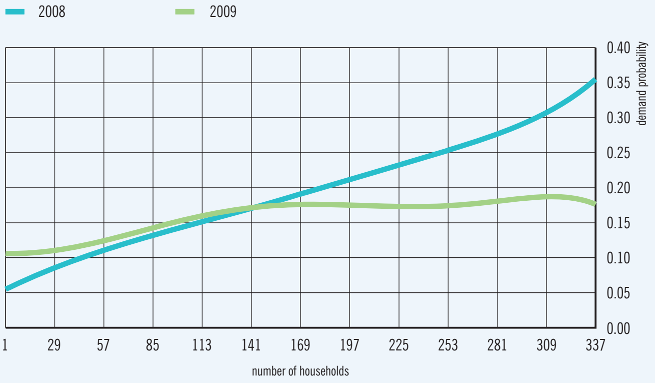
Source: CNB.

The expected slight increase in disposable income due to the rise in nominal wages could in 2011 intensify the revival of household demand for new loans, which was significantly reduced during the crisis (See Box 3 The role of supply and demand in cyclical fluctuations of household debt). By end-2011, this could end the downward trend in total household debt. Still, the persistent, though less intense, fall in employment will keep uncertainties high and dissuade households from any very heavy borrowing. In the absence of any major shocks entailing exchange and interest rate risks, rising unemployment will remain the main driver of increases in household debt service risk.

Box 3 The role of supply and demand in cyclical fluctuations of household debt

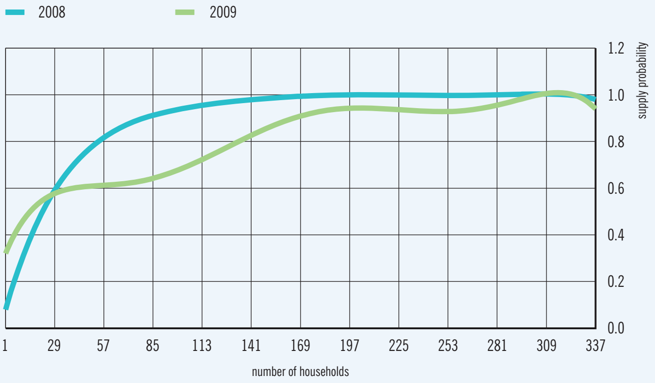
As strong bank lending in many countries came to a halt after the outbreak of the financial crisis, many economists were led to conclude that oscillations in banks' credit policies, especially in the segment of household lending, had been one of the major causes of the current crisis.[1] The materialisation of credit risk accumulating in the balance sheets of financial institutions due to optimism and excessive risk appetite resulted in huge losses and a decrease in their capitalisation. The feedback loop from banks' efforts to strengthen capital levels in such conditions by further reducing lending contributed to the weakening of the global economy and led to the escalation of the financial crisis.[2] This is why discussion on the design of new prudential regulations for financial institutions have primarily focused on curbing excessive fluctuations in lending and alleviating negative effects that the materialisation of credit risk has on lending activity and, in turn, on economic activity. However, the efficiency of prudential regulations in the prevention of future credit crunches will depend on whether they are primarily a consequence of the tightening of banks' credit policies (supply) or of the fall in demand for loans caused by income reduction, reduced asset value and unemployment growth. Also important for financial stability are potential changes in the riskiness of households taking out loans.[3]

Figure 1 Loan demand probability



Sources: EIZG and CNB.

Figure 2 Loan approval probability



Sources: EIZG and CNB.

The main purpose of this analysis is to determine whether the decline in household lending after the outbreak of the crisis in Croatia was primarily caused by the pro-cyclical behaviour of banks (restrictive credit policies) or by a decrease in demand for loans, as well as what effect these changes in loan supply and demand had on the profile of household borrowers.[4] The effect of banks' credit policies prevailing in a specific year was isolated using data on newly-granted household loans in the 2008 to 2009 period, available in the Household Budget Survey.[5] Two interrelated segments of credit policies were modelled in separate steps: the criteria that households had to satisfy in order to qualify for a loan (loan availability) and the highest loan amounts banks were willing to approve to creditworthy households (credit limits). Taken together, these two segments provide a complete insight into banks' behaviour during the crisis since tightened lending conditions may be observed in the form of more difficult access to credit, and not only in the form of a decrease in the average loan amounts granted.

The first step of the analysis was to estimate the probability of loan demand and loan supply for each household in the sample before (2008) and after the outbreak of the crisis (2009). Specifically, household i is indebted ($P_i = 1$) if there is loan demand ($D_i = 1$) which can be readily met by loan supply ($S_i = 1$). On the other hand, a household is not indebted ($P_i = 0$) if there is no incentive from at least one of the two sides ($D_i = 0$ and $S_i = 1$ or $D_i = 1$ and $S_i = 0$ or $D_i = 0$ and $S_i = 0$). Since HBS data allow only for the identification of indebted households rather than actual supply and demand, a partial observability model (PO model) was estimated. The PO model, which enables the assessment of both the likelihood of a household applying for a loan and a bank approving the loan, even when these probabilities are not separately observed, assumes that the probability distribution of household indebtedness (P_i) is a normally distributed bivariate process. The equations assessing each side of the market have to differ in at least

---

[1] For a detailed study of the effect of the loosening of credit standards for household debt and loan default see A. Mian and A. Sufi: *The Consequences Of Mortgage Credit Expansion: Evidence From The U.S. Mortgage Default Crisis*, Quarterly Journal of Economics, November 2009.

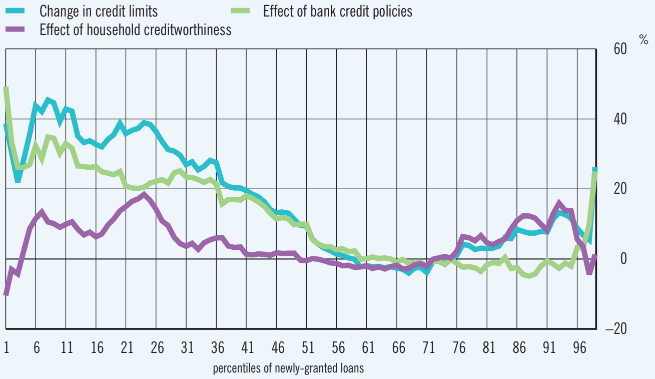
[2] The theory of the pro-cyclical behaviour of economic entities is commonly linked with the financial instability hypothesis introduced by Hyman Minsky in 1957.

[3] For the theoretical foundation and empirical confirmations of cyclical changes in the riskiness of borrowers see P. Celem, M. Cannon and L. Nakamura: *Credit Cycle and Adverse Selection Effects in Consumer Credit Markets–Evidence from the HELOC Market*, Working Paper No. 11–13, Research Department, Federal Reserve Bank of Philadelphia, 2011, available at: www.philadelphiafed.org/research-anddata/publications/working-papers/.

[4] The analysis of household lending presented in this box builds upon the analysis shown in Box 3 Credit policies of banks and household debt in 2009, *Financial Stability*, No. 6, January 2011.

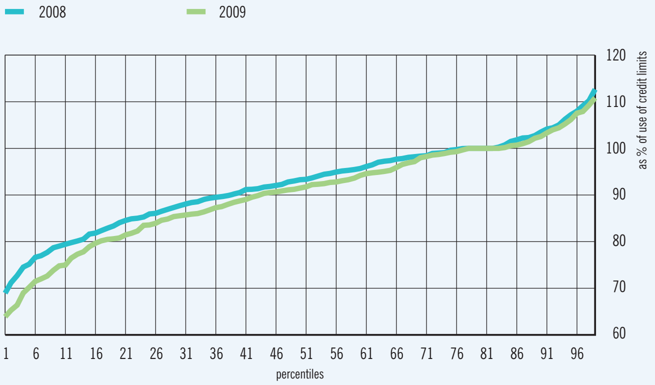
[5] The micro-data from the Household Budget Survey (HBS) were used. The analysis was made within the project *Household Credit Risk in Croatia: An Analysis Based on the Household Budget Survey* (2009), prepared by the Institute of Economics, Zagreb, and the Croatian National Bank.

Figure 3 Contributions of bank credit policies and household creditworthiness to the change in credit limits between 2008 and 2009



Sources: EIZG and CNB.

Figure 4 Use of available credit limits



Sources: EIZG and CNB.

one explanatory variable in order to allow for the separation and identification of supply and demand. The variables used on the supply side increase the probability of loan approval: a fixed-term working contract, life insurance investment used, especially in housing lending, as loan collateral, and payment commitments on previously taken loans, as for banks they are signals of households' capacity to regularly service their debt. A subjective assessment of households having financial difficulties in servicing living costs, which increases the probability of their applying for a loan, was used on the demand side.[6] The change in the estimated probabilities for loan approval reflects changes in banks' credit policies relating to loan availability and their effect on the household debt dynamics.

The probability for the existence of loan demand, simulated on a sample of households from 2008 by means of the coefficients estimated separately for the period before and after the outbreak of the crisis, shows that in 2009 household propensity to borrow declined on average by 5 percentage points relative to 2008 (Figure 1). The probability increased for the households that in 2008 had the lowest income and a small probability for loan demand. Specifically, due to a drop in the available household income after the outbreak of the crisis, some households, which also had difficulties in servicing their needs before the crisis, had to increase their reliance on bank loans. In contrast, the probability for the existence of loan demand declined for households that had the highest propensity to borrow and the highest income level before the crisis.

The probability for loan approval also declined in that period, dropping from an average 90% in 2008 to 81% in 2009 (Figure 2). The conducted analysis suggests that the probability for household borrowing in 2009 decreased due to a combination of tightened banks' loan approval criteria (supply) and an on average lower household propensity to borrow (demand).

The estimated probabilities for loan demand and loan approval were in the second step of the analysis integrated with an assessment of the maximum loan amounts (credit limits) that banks were willing to grant to creditworthy households. Both segments of loan supply were thus integrated. The credit limit for each household was estimated using a quantile regression model (QR)[7] in which the maximum available loan amount (y_i) is modelled according to household characteristics (x_i) as an indicator of its creditworthiness and the estimated probability for that household demanding a loan (d_i) and the bank approving (s_i) that loan pursuant to its credit policy (β_{80}).

$$Quant_{80}(y_i/x_i, d_i, s_i) = x_i\hat{\beta}_{80} + h_{80}(d_i \cdot s_i)$$

Finally, in order to separate the effect of changed bank credit policies in the segment of maximum available loan amounts from the change in the creditworthiness of indebted households, which can in the course of time influence both loan supply and demand, a decomposition technique was employed, based on the construction of a counterfactual distribution of loans taken pursuant to bank credit polices in the previous year with the characteristics of indebted households in the current year (the so-called Machado-Mata decomposition).

The decomposition of the increase in credit limits, which takes into account the effect of the change in household creditworthiness, shows that in 2009, despite the more difficult access to loans, banks offered higher maximum loan amounts to the households they considered creditworthy, which more than compensated for the effect of the increasingly restricted access to loans (Figure 3). The households that were able to obtain a bank loan under such conditions had on average better creditworthiness than those that took out a loan in 2008, which confirms that banks were oriented towards higher-quality clients during the crisis in order to reduce the credit risk exposure of their portfolios.

---

[6] In addition to this combination of identification variables, also tested on the demand side were the variables identifying the number of children, the number of employed household members, child births, the amount of remittances and the rural area of residence; the variables also tested on the supply side include: home ownership, marriage status, the amount of previous loans and the rural area of residence.

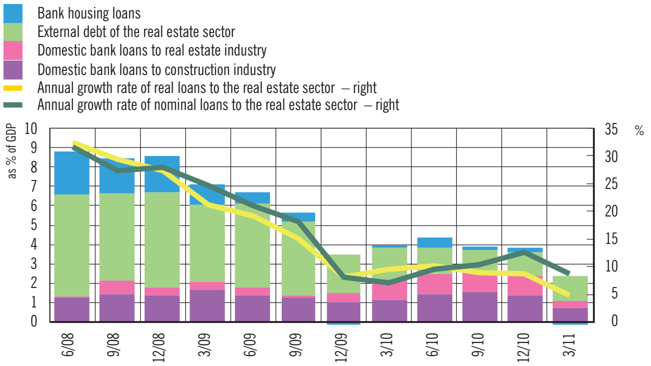
[7] The credit limits were estimated by means of the coefficients estimated at the 80th percentile of the counterfactual distribution of the amounts of newly-granted loans. At the lower quantiles of household indebtedness, demand is assumed to have a decisive effect on the amount of debt, whereas in the case of the most indebted households it is more likely that banks' credit policies are a limiting factor for their debt amount. The choice of the sufficiently high percentile to represent the credit limit is arbitrary.

Despite the increase in loan amounts offered in 2009, they were much less used by households than in the previous year, with the result that the average exploitation of the available credit limits declined from 92% in 2008 to 90% in 2009 (Figure 4). The reduced reliance on new bank loans in 2009 suggests that households to some extent adjusted their spending habits to recession and, consequently, reduced their total debt.

The analysis showed that banks only partially tightened their lending polices as a reaction to adverse economic developments in 2009 and the increase in the share of non-performing loans. Such bank behaviour was primarily reflected in a more restrictive customer selection: the creditworthiness of households that obtained a loan in 2009 was considerably better than that of the households that were granted a loan in 2008. However, banks generally acted counter-cyclically, increasing credit limits to creditworthy households in 2009. Due to the weakened demand of households, these limits were relatively less used than in the period before the financial crisis, which is an indication that in the process of household deleveraging in 2009 the adjustment of demand had a more prominent role than changes on the supply side.

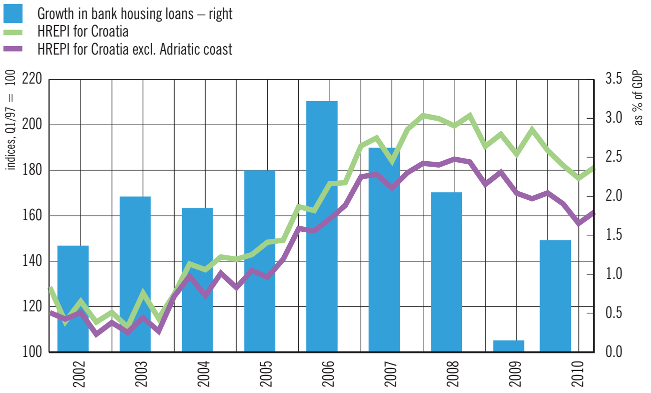
Real estate sector

Figure 48 Annual growth of domestic loans and external debt of the real estate sector, adjusted by exchange rate changes



Note: The figures relating to domestic loans granted to the real estate sector before 2010 were slightly modified due to the new classification of activities.
Source: CNB calculations.

Figure 49 Housing loans and HREPI[a] on a quarterly basis



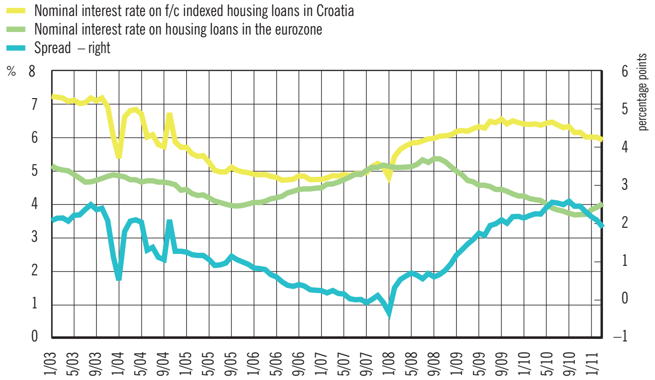
[a] The hedonic real estate price index takes into account qualitative characteristics of the real estate.
Source: CNB calculations.

Although the expected mild growth in household income will reduce downward pressures on prices of residential property and improve its financial availability in 2011, a significant recovery in housing loans and growth in residential property prices are not yet to be expected.

Borrowing of the real estate sector continued at a steady pace in 2010, while its overall debt, adjusted by exchange rate changes, slightly decreased in effective terms in early 2011. This was the main reason for the slowdown in the year-on-year growth rate of the nominal debt amount from 12.5% in late 2010 to 8.7% in late March 2011 (Figure 48). In the observed period, such borrowing dynamics of the real estate sector was mostly affected by a contraction in domestic lending to corporates dealing in construction and real estate management in early 2011, which followed its strong growth at a stable pace in 2010. External financing was already reduced in late 2010, but an upsurge in mid-year kept its annual growth at a high level. At the same time, housing loans held steady as the bulk of their annual increase in nominal terms was due to exchange rate effects (Figure 49).

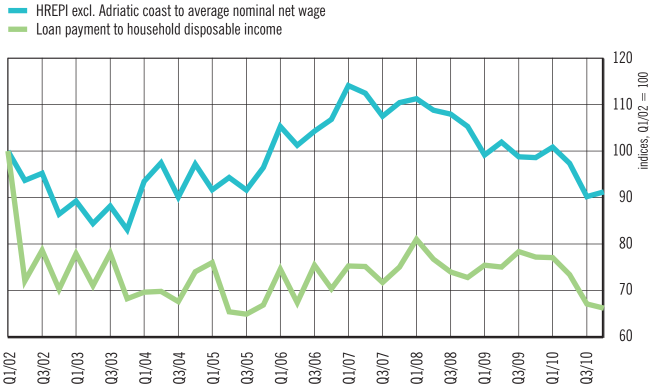
Household demand for real estate has remained relatively weak despite the drop in real interest rates on housing loans (Figure 50) and the rise in household disposable income in the second half of 2010. The downward trend in residential property prices throughout Croatia thus gained speed in the second half of 2010, so that their annual rate of decline averaged –7.0%, while the cumulative decrease from record high prices in late 2008 amounted to –11.1% (Figure 49). The fall in residential property prices on the Adriatic coast, which have until recently been more resilient to the impact of recession, gained momentum in late 2010, possibly under the influence of residential price movements in other Mediterranean countries. The year-on-year decline in real estate prices excluding the real property

Figure 50 Comparison of interest rates on housing loans in Croatia and the eurozone



Sources: CNB and ECB.

Figure 51 Financial availability of residential property



Sources: CBS and CNB calculations.

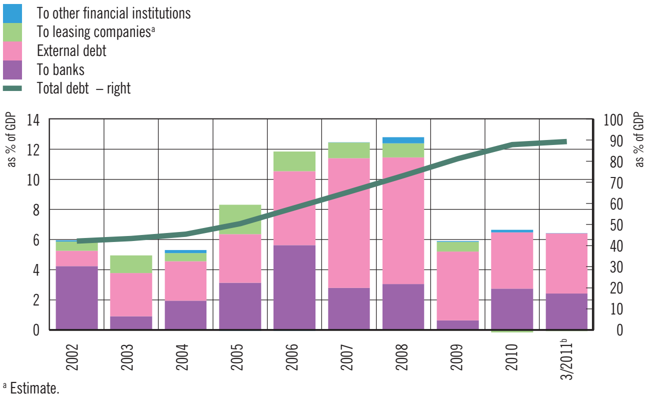
prices on the coast was somewhat lower than that in the whole of Croatia (–5.6%) in the second half of 2010.

The drop in residential property prices in the second half of 2010 and the slight growth in wages due to tax system changes, as well as the resultant increase in household disposable income, improved the financial availability of real estate relative to mid-2010 (Figure 51). Similar trends are expected to continue in the remainder of 2011. In addition, models of government subsidising and a possible continued decrease in interest rates on housing loans could further improve the financial availability of residential property and slightly increase housing loans in 2011. Developments in the basic determinants of real estate demand will thus stop exerting downward pressures on real estate prices in 2011. However, whether the fall in property prices will end depends primarily on labour market developments, household expectations about future price dynamics and the intensity of possible pressures from creditors to speed up the sale of newly-finished residential real estate.

Non-financial corporate sector

Non-financial corporate debt has continued to grow at a moderate pace, while the increase in domestic and foreign loans came close to sustainable levels. Loans have gradually been redirected towards the tradable sector, while the exposure of non-financial corporations to currency and interest rate risk stayed traditionally high.

Figure 52 Change and non-financial corporate debt stock

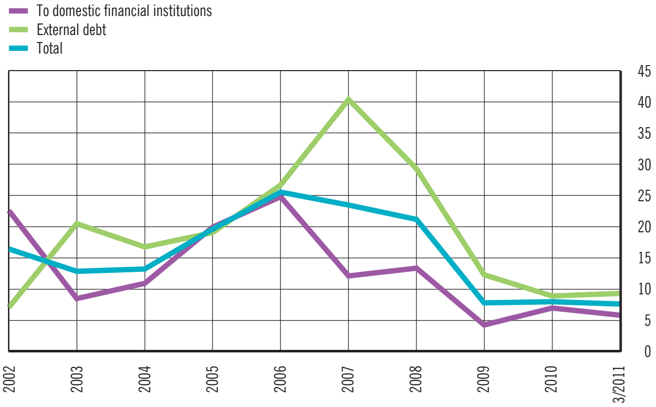


[a] Estimate.

[b] Year-on-year increase in debt as at end-March 2011.

Sources: CNB and HANFA.

Figure 53 Annual growth rate of non-financial corporate debt



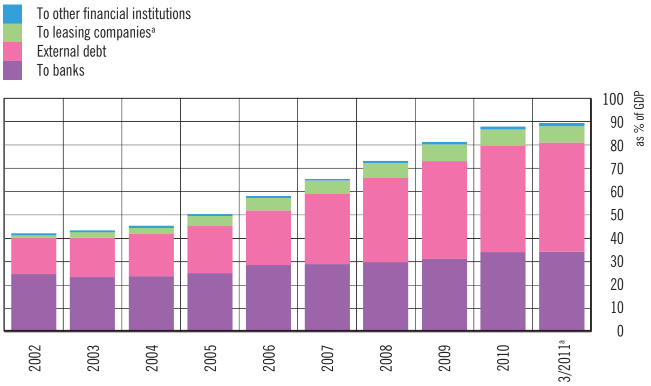
Sources: CNB and HANFA.

Borrowing of non-financial corporations continued at a steady pace in late 2010 and early 2011 but was much slower than in the pre-crisis years. The annual rate of growth in non-financial corporate debt ranged between 7% and 8%, while the effective dynamics of debt (excluding the impact of exchange rate changes) was only slightly slower in that period. Similar tendencies are expected to continue in the remainder of 2011.

Domestic borrowing of the corporate sector began to recover in early 2010 and its growth became stable in late 2010 and early 2011. Until March 2011, the year-on-year growth in domestic corporate debt remained at the September 2010 level and almost entirely related to domestic bank loans, while financing from other financial institutions and leasing companies was stagnant (Figure 52). In March 2011, domestic borrowing continued to grow at a lower year-on-year rate than external debt (5.9% vs 9.3%) (Figure 53); the major share in corporate debt growth was thus still accounted for by the increase in foreign borrowing. The increase in external debt was still much more moderate than in the years immediately preceding the crisis.

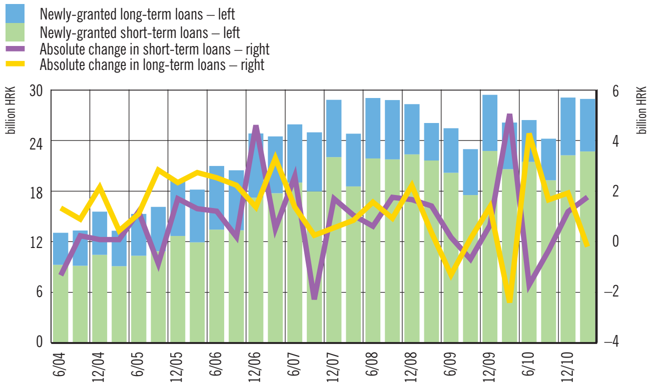
The described borrowing dynamics of non-financial corporations increased the ratio of their total debt to GDP from 85.3% at end-September 2010 to 89.4% in March 2011. Foreign sources continued to account for more than half of total financing to the non-financial corporate sector, while financing from domestic banks accounted for slightly less than 40% of non-

Figure 54 Non-financial corporate debt



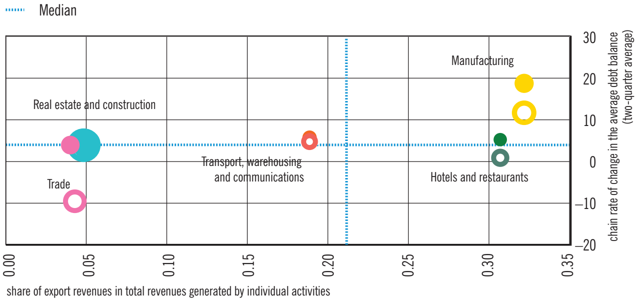
[a] Estimate.
Sources: CNB and HANFA.

Figure 55 Newly-granted bank loans and absolute change in the stock of gross loans



Source: CNB.

Figure 56 External debt allocation by sectors from September 2010 to March 2011



Note: A full circle denotes the debt dynamics in the last two quarters observed (the average debt balance at end-March 2011 and end-December 2010 relative to the average debt balance at end-September and end-June 2010). An empty circle denotes the same change in the debt balance in the previous period (the average debt balance at end-September and end-June 2010 relative to the average debt balance at end-March 2010 and end-December 2009). The size of the circle denotes the significance of a particular activity's share in total external debt of non-financial corporations. Activities accounting for a relatively minor share in total debt are not presented.
Sources: CNB (external debt) and FINA (export and total revenues).

financial corporate debt (Figure 54). With steady moderate growth in corporate debt and the expected relatively low GDP growth, the ratio of non-financial corporate sector debt to GDP could increase slightly by the end of 2011.

Stronger corporate borrowing is also evident in higher growth of newly-granted loans from domestic banks in the previous two quarters, mostly due to the rise in short-term loans (Figure 55).

A change in sectoral trends of corporate borrowing in favour of stronger borrowing by corporations from the tradable sector began in 2010 and continued into early 2011. Borrowing intensified in the manufacturing industry, which recorded an above-average debt growth in the observed period. Due to improved availability and relatively lower prices of foreign funds, corporations from that industry increased their foreign borrowing to compensate for slow borrowing from domestic banks. A similar trend was observed in commerce and hotels and restaurants (Figure 56), while foreign borrowing by enterprises in the sectors of real estate, construction, and transport, warehousing and communications levelled off.

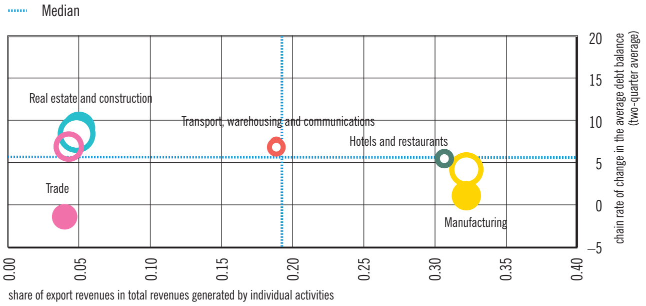
Such allocation of loans enables a reallocation of resources to export-oriented activities, which increases the contribution of foreign demand to economic growth. Nevertheless, debt of corporations from the non-tradable sector has continued to increase, which is particularly evident in real estate and construction activities.

In contrast to new foreign borrowing, where the share of debt of corporations from the tradable sector has steadily increased in recent quarters, the sectoral structure of domestic financing still reflects insufficiently rapid structural adjustment of the economy. In the last quarter of 2010 and the first quarter of 2011, domestic banks continued to increase strongly their exposure to corporations from the non-tradable sector. Corporates dealing in real estate management and construction have continued to record the strongest growth and account for the largest aggregate share in total loans by domestic banks, while the debt of the manufacturing industry has all but stagnated (Figure 57).

From the standpoint of the currency exposure of individual activities, these developments are favourable because activities with a higher share in export revenues borrow more strongly abroad. However, a reason for concern is the still sizeable exposure of banks to activities that in the previous period recorded the strongest growth and highest levels of non-performing loans. This indicates that banks are slow to turn to new clients with higher growth potential (see Box 4 Patterns of corporate lending in crisis situations in *Financial Stability*, No. 6, January 2011).

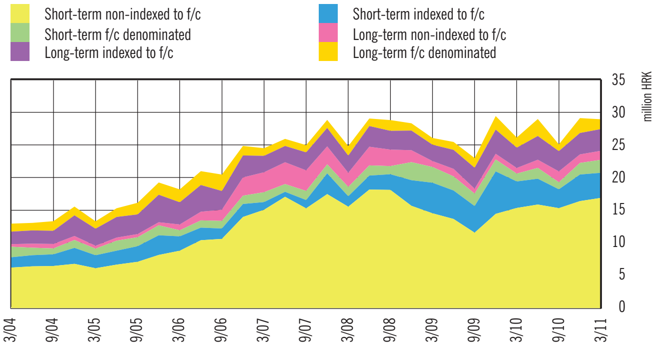
The recovery in corporate kuna financing, which began in 2010, continued in the first quarter of 2011 as the impact of the financial crisis waned. A slight change in the currency structure of newly-granted loans was noticeable in both short- and

Figure 57 Allocation of domestic bank loans by sectors from September 2010 to March 2011



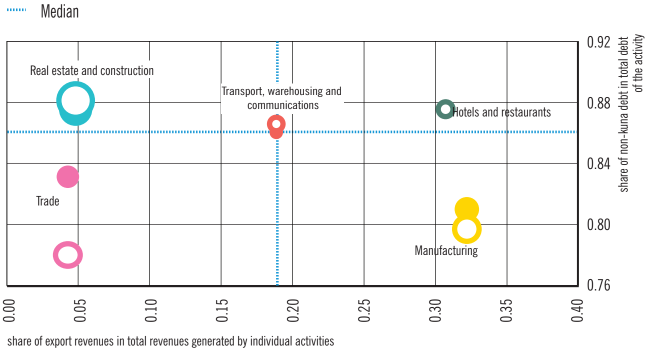
Note: A full circle denotes the debt dynamics in the last two quarters observed (the average debt balance at end-March 2011 and end-December 2010 relative to the average debt balance at end-September and end-June 2010). An empty circle denotes the same change in the debt balance in the previous period (the average debt balance at end-September and end-June 2010 relative to the average debt balance at end-March 2010 and end-December 2009). The size of the circle denotes the significance of a particular activity's share in total debt of non-financial corporations to domestic banks. Activities accounting for a relatively minor share in total debt are not presented.
Sources: CNB (loans by activity) and FINA (export and total revenues).

Figure 58 Breakdown of newly-granted loans to non-financial corporations by maturity and currency



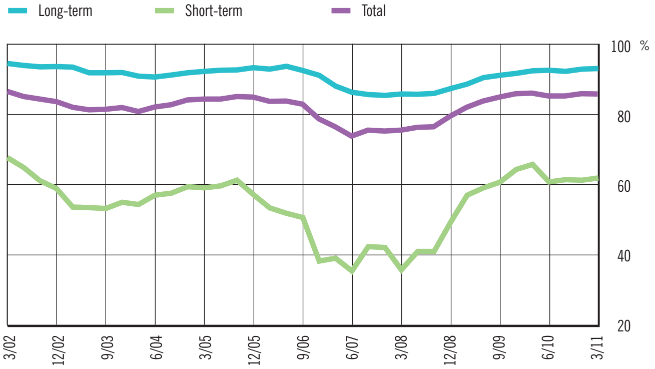
Note: Short-term loans comprise personal overdrafts, which are statistically recorded as newly-granted loans in each month.
Source: CNB.

Figure 59 Currency exposure in March 2011



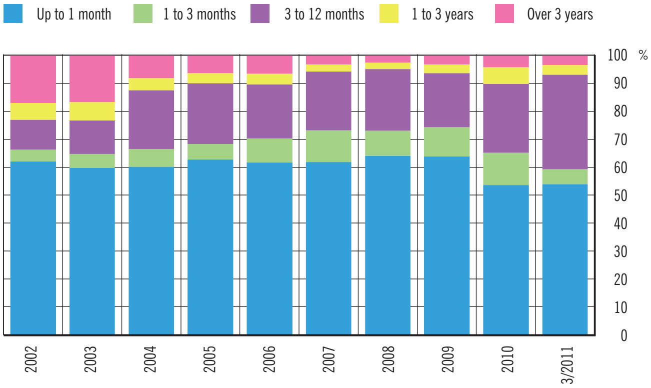
Note: A full (empty) circle denotes the share of non-kuna debt in March 2011 (September 2010). The size of the circle denotes a particular activity's share in total debt of non-financial corporations. Activities accounting for a relatively minor share in total debt are not presented.
Sources: CNB (loans by activity) and FINA (export and total revenues).

Figure 60 Share of corporate non-kuna debt[a] in total loans



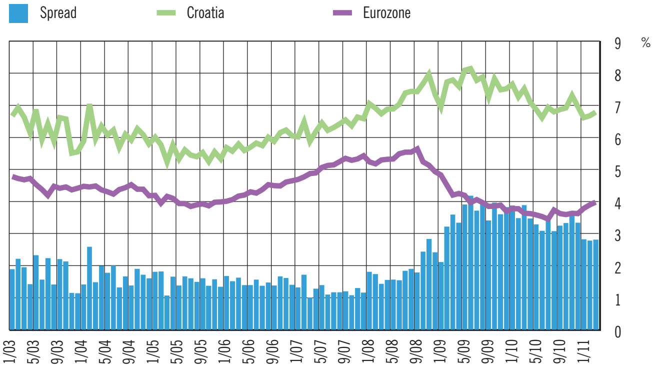
[a] It is assumed that total external debt is denominated in foreign currencies.
Source: CNB.

Figure 61 Breakdown of bank loans to non-financial corporations by interest rate variability



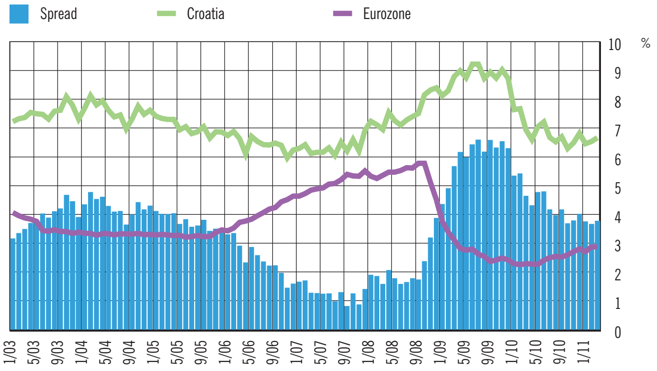
Source: CNB.

Figure 62 Interest rates on long-term loans to non-financial corporations in Croatia and the eurozone



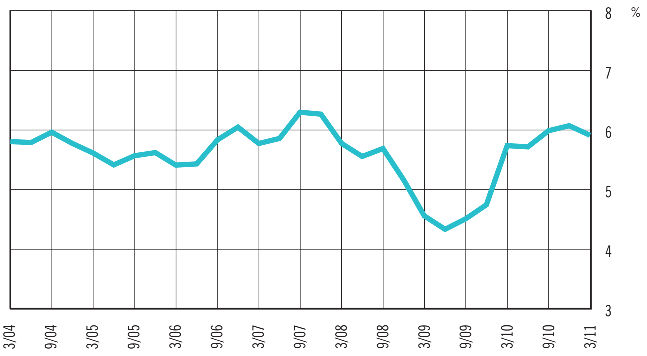
Sources: CNB and ECB.

Figure 63 Interest rates on short-term loans to non-financial corporations in Croatia and the eurozone



Sources: CNB and ECB.

Figure 64 Ratio of transaction account deposits of non-financial corporations to gross value added



Source: CNB.

long-term corporate loans (Figure 58). However, this change had only a marginal impact on the currency structure of total loans to the non-financial corporate sector; more than 85% of them are foreign currency loans, and no significant changes are expected in the remainder of 2011 (Figure 60).

Hence, corporate exposure to currency risk has remained extremely high, though gradual changes in relative exposures have been observed. They involve the strengthening of the correlation between the share of export revenues and the share of non-kuna debt (Figure 59). Corporates dealing in activities that heavily borrowed abroad (manufacturing and trade) increased their exposure to currency risk in the described period, but it still stayed below the average value for all corporates. Other economic sectors slightly reduced their currency exposure.

Exposure of non-financial corporations to interest rate risk remained high in the first quarter of 2011, although it was lower than in September 2010. Loans with interest rates variable within a year continued to account for around 90% of total corporate loans. The average period in which interest rates are variable within a year slightly lengthened (Figure 61). Non-financial corporations have remained extremely vulnerable to possible stronger fluctuations in interest rates, which will not change significantly by the year-end.

Easier access to foreign funding sources and a slight decrease in their costs led to a continued downward trend in bank interest rates on long-term corporate loans. However, these rates were still higher in early 2011 than in the period preceding the escalation of the crisis. Interest rates on short-term kuna loans, which dropped substantially in early 2010, held steady at levels close to those before the crisis. The parallel increase in eurozone interest rates somewhat narrowed the spread between interest rates on corporate loans in Croatia and the eurozone (Figures 62 and 63). The narrowing of this interest rate differential may be expected to continue in the remainder of 2011 due to the announced further growth in interest rates in the foreign market. Provided that the country risk premium decreases, this could result in a stagnation of domestic interest rates.

In late 2010 and early 2011, liquidity of non-financial corporations, measured as the ratio of their transaction account deposits to gross value added, was approximately the same as in the pre-crisis period (Figure 64).

Box 4 Macroeconomic shocks and corporate credit risk

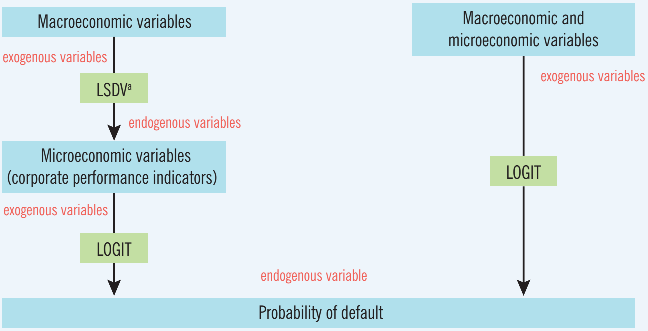
The materialisation of credit risk in the corporate sector adversely affected Croatian banks' earnings in the period following the outbreak of the crisis and is likely to remain their most significant challenge in the forthcoming period. The quality of loans granted to the corporate sector is therefore a key factor to observe in estimating the banking sector's vulnerability to various shocks. Corporate credit risk models are tools that, in combination with macroeconomic credit risk models, are often used for that purpose and take the lead among analytical approaches to credit risk analysis. These models are mostly based on financial indicators of individual enterprises, and attempts have recently been made to improve their performances by directly or indirectly incorporating macroeconomic variables in order to make them suitable for examining the effect of macroeconomic shocks on corporate credit risk.

This text presents an improved CNB micro model for corporate credit risk (based on the availability of a longer time series of data, which now incorporates the beginning of the world financial crisis, and an improved methodology for the selection of variables affecting the probability of default) and links the dynamics of the main macroeconomic variables to financial indicators of individual enterprises. Macroeconomic variables are indirectly integrated in the corporate credit risk model through an assessment of their impact on balance sheet data.[1] In addition, such micro system construction provides for simulations within the context of testing the banking system's resilience to losses deriving from lending to non-financial enterprises, which may be used for more precise estimations of banks' risk profiles.

This approach consists of several steps. The first step involves an update of the micro model for corporate credit risk used to predict the probability of default for individual enterprises based on financial statement data (see Financial Stability No. 3, June 2009) and estimate banks' exposure at default. An assessment of the effect of macroeconomic variables on the selected indicators from non-financial enterprises' balance sheets follows after the selection of the key financial indicators, whereas in the preparation of the projections based on these models this order is reversed.

The latest version of the credit risk model was estimated using data on corporate credit risk exposure from the CNB's prudential database for the 2007 to 2009 period and FINA annual financial statements of entrepreneurs for the 2006 to 2008 period. This model enables the prediction of the probability of default within a one-year horizon in relation to the last period for which enterprises' financial indicators are available. The assessment of the model, which links macroeconomic factors to financial indicators, used data on gross domestic product growth, exchange rate changes and the inflation rate as well as selected indicators constructed based on FINA annual financial statements of entrepreneurs for the 1996 to 2009 period. The macroeconomic variables employed are compatible with the CNB's standard stress testing approach. This model will be used to extrapolate enterprises' financial indicators for the period until 2012 based on various scenarios.

Figure 1 Two ways of integrating of macroeconomic shocks into the micro model of corporate credit risk



[a] LSDV stands for the least square dummy variable model.
Source: CNB.

Micro model for corporate credit risk

The probability of default is estimated by means of the maximum probability method within a logistic regression by means of which the expected enterprise default probability $F[X_i, \beta]$ can be written as follows:

$$F[X_i,\beta] = 1/(1+e^{-z});\ z = \beta_0 + \beta_{1,t}x_{1i,t} + \ldots + \beta_{k,t}x_{ki,t}$$

where X_i is a set of financial indicators of enterprise i and β a set of estimated parameters accompanying these indicators.

Financial statements of non-financial enterprises were used to construct eighty financial indicators and eight binary variables signifying enterprise activity. As it is impossible to examine all combinations of potential descriptors due to the very large number of assessments, several heuristic methods for the selection of dependent variables were employed in order to improve the existing credit risk model: the stepwise forward selection,[2] the stepwise backward selection, parallel genetic algorithms[3] and Bayesian model averaging.[4]

The models are compared according to their discriminatory power in classifying enterprises as good and bad debtors, that is, based on the criteria of the area under the ROC Curve and model sensitivity/specificity statistics. The ROC Curve (Receiver Operating Characteristics) is a graphic presentation of the relationship between the sensitivity and (1-specificity) of the models for all potential intervention values, with sensitivity representing the frequency of correctly classifying an enterprise whose observed situation is "default" and specificity representing the probability of correctly classifying an enterprises whose observed situation is "no default". The area under the ROC curve is a measure of the model's discriminatory power.

---

[1] See E. Bernhardsen and B. D. Syversten: *Stress Testing the Enterprise Sector's Bank Debt: A Micro Approach*, International Journal of Central Banking, 2009, vol. 5, pp. 111-138; K. Carling, T. Jacobson, J. Lindé, K. Roszbach, *Exploring relationships between Firms' Balance Sheets and the Macro Economy*, Sveriges Riksbank, 2004.

[2] E. Hayden, A. Stomper and A. Westercamp: *Selection vs. Averaging of Logistic Credit Risk Models*, 2009.

[3] M. Zhu and H. A. Chipman: *Darwinian Evolution in Parallel Universes: A Parallel Genetic Algorithm for Variable Selection*, 2005.

[4] A. E. Raftery: *Bayesian Model Selection in Social Research*, September 1994.

Based on an analysis of the results of three variable selection methods, five financial indicators were chosen, whose combination allows for the best classification of enterprises according to credit risk. The following indicators were chosen:

- a liquidity indicator: the ratio of short-term liabilities to total assets *(variable 8);*
- an own funding coefficient: the ratio of shareholders' equity to total assets *(variable 18);*
- a financial leverage ratio: the ratio of retained earnings to total assets *(variable 24);*
- an accounts receivable turnover ratio: the ratio of operating income to accounts receivable *(variable 37);*
- an asset turnover coefficient: the ratio of operating income to total assets *(variable 45).*

Table 1 Panel regression results

Independent variable	Variable 8	Variable 18	Variable 24	Variable 37	Variable 45
Constant	0.6560	0.2667	–0.0159	28.3194	2.1285
GDP_t					0.0028
GDP_{t-1}			0.0017	0.2732	0.0120
Exchange rate $change_t$	–0.0013				–0.0039
Exchange rate $change_{t-1}$	0.0027	–0.0026			
$Inflation_t$	–0.0029	0.0013	0.0007	0.1412	
$Inflation_{t-1}$	0.0051	–0.0034			
@trend	–0.0098	0.0039	0.0090	–0.6412	–0.0724
d2002	0.0046	–0.0149	–0.0044		–0.0305
R2	0.7139	0.7418	0.6513	0.5267	0.6752

Note: All parameters are statistically significant at 1% level. d2002 is dummy variable which equals one in the period from 2002 onwards and represents the methodological change in the FINA's database of corporate financial reports.
Sources: CNB and FINA.

The selected corporate credit risk model, due to a longer time horizon and more careful selection of variables, showed significant changes compared with the previously estimated model. Only one dependent variable remained the same (the ratio of the shareholders' equity to total assets) while other variables are new, although they still belong to the same indicator group.

All variables in the estimated micro model for credit risk are significant at the level of 1%, and coefficients related to these variables have anticipated signs.

Macroeconomic variables and financial indicators

The pre-testing of model estimations pointed to a significant influence of unobserved heterogeneous factors, specific for each enterprise *(i)*, to a specific financial indicator (*w*). These so-called fixed effects (FE) were separated in the estimation of parameters (β) via the least square dummy variable (LSDV) model.

$$w_{i,t} = x\beta + FE_i + \varepsilon_{i,t}$$

The results of the model for all enterprises, irrespective of their activity, show that enterprises' illiquidity on average grows in line with the depreciation of the kuna/euro exchange rate and inflation growth. Own funding decreases under conditions of the kuna/euro exchange rate depreciation and inflation. None of the two mentioned indicators essentially depends upon changes in the aggregate income.

The ratio of retained earnings to assets increases in line with the increase in the aggregate income in the previous year, and inflation leads to an increase in the ratio. The accounts receivable turnover ratio is in a positive relationship with the economic growth rate and inflation. Enterprises' activity measured by the ratio of operating income to assets increases in line with the increase in the aggregate income and decreases under conditions of the kuna/euro exchange rate depreciation.

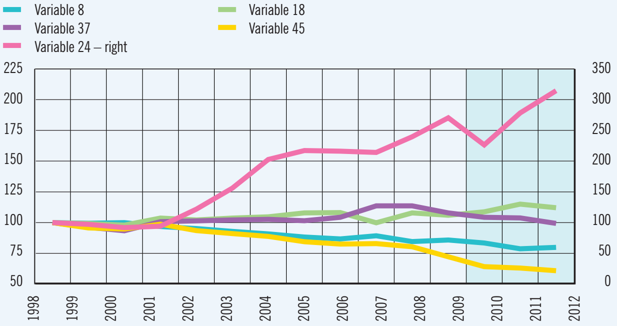
Since models estimated for specific economic activities mostly produced results similar to those of the aggregate model, further analysis will be carried out on the aggregate model. The dynamics of financial indicators for individual enterprises in the 2010 to 2012 period was projected by means of a baseline and highly unlikely shock scenario equal to those used in stress testing of banks by means of the macroeconomic credit risk model (see Box 5). After the averages of estimated financial indicators deteriorated in 2010, the model under the baseline scenario predicts their slight improvement in the following two years.

Table 2 Estimated contributions of individual macroeconomic variables to the changes in default probability

Independent variable	Variable 8	Variable 18	Variable 24	Variable 37	Variable 45	Total
GDP			–0.00033	–0.00007	–0.00101	–0.00140
Exchange rate change	0.00008	0.00045			0.00026	0.00079
Inflation	0.00012	0.00037	–0.00014	–0.00003		0.00032

Note: Individual contributions are calculated as a product of the estimated parameters from the macro model and the marginal coefficients from the micro model.
Source: CNB.

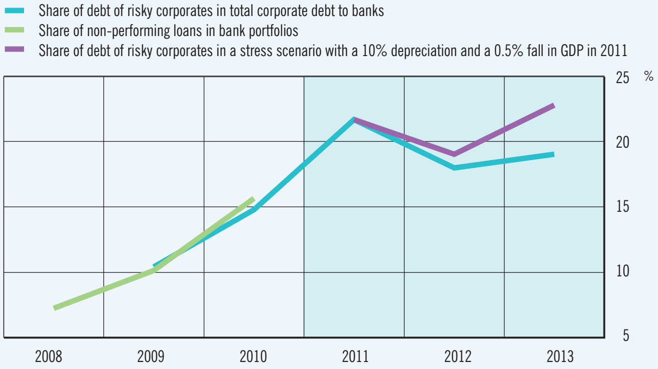
Figure 2 Projection of changes in the average of financial indicators based on the baseline scenario macro model (all variables are shown as basis indices, 1998 = 100)



Note: The shaded area shows the projected values.

Sources: CNB and FINA.

Figure 3 Dynamics of changes in the estimated average probability of default



Note: The shaded area shows the projected values.

Source: CNB.

The projections of the dynamics of financial indicators for the 2010 to 2012 period are used to estimate the probability of default with a one-year time lag. The contribution of specific macroeconomic variables' trends to the dynamics of non-performing corporate loans was approximated at the levels of their average values (Table 2). The growth of aggregate income reduces the probability of enterprise defaulting, whereas inflation growth and the depreciation of the kuna/euro exchange rate increase the probability of default in the forthcoming period.

The critical value of probability based on which the amounts of non-performing loans were projected was optimised by the equalisation of the cumulative share of risky enterprises' debt, defined according to that probability, and the average share of non-performing loans for 2008. Due to the deterioration of enterprises' performance indicators in 2009, caused primarily by the strong economic contraction, the estimated share of risky enterprises' debt in total debt continued to increase to over 21.7% in 2011, decreasing slightly in the following two years. However, under the shock scenario (projecting a 10% depreciation of the kuna/euro exchange rate in 2011 and a decrease in the gross domestic product of 0.5% and 0.8% in 2011 and 2012 respectively) the estimated share of risky enterprises' debt rebounds to approximately 23% in 2013.

Conclusion and direction of further research

The projection of the dynamics of non-performing corporate loans, derived from the composite approach including the effect of macroeconomic variables, suggests that non-performing corporate loans might stabilise in 2012, after having continued strong growth in 2011. This model also suggests that an additional shock, such as the depreciation of the kuna exchange rate, could trigger further growth of non-performing loans so that they might again reach the level of 23%.

When the results are interpreted, it should be borne in mind that estimated models need not have stable parameters, and especially that the heterogeneous behaviour of enterprises could lead to projection errors deriving from averaged responses, with potential idiosyncratic behaviour of riskier enterprises requiring special attention. In the course of time it will be possible to develop an alternative approach based on the direct incorporation of macroeconomic variables in the micro model for corporate credit risk. Until then, efforts will be made to improve the microeconomic model for corporate credit risk, especially the projections of enterprises' financial indicators, in order to obtain best possible assessments of the reactions of corporate credit risk to shocks in the macroeconomic environment.

Banking sector

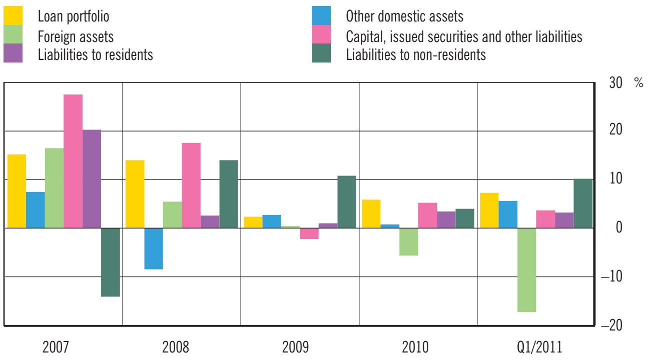
Developments in late 2010 and early 2011 show that the gradual stabilisation of banking sector operations has continued. The rise in costs related to non-performing loans slowed down, which, together with a slight increase in loans and somewhat larger interest margins, led to a moderate increase in net earnings. The expected gradual recovery of economic activity in the remainder of 2011 will give a boost to loan demand. Coupled with slower growth in non-performing loans, this will strengthen bank capitalisation and financial stability.

Balance-sheet vulnerabilities

Against the backdrop of persistently weak economic activity, banks continued to increase their credit portfolios at a moderate pace in late 2010 and early 2011. As this increase was mostly financed from freed-up liquidity reserves, banks did not need to increase the aggregate balance sheet, which (after correction for exchange rate changes) held steady in the last quarter of 2010 and the first quarter of 2011. Bank assets increased by 3.4% in nominal terms in 2010, primarily due to the appreciation of the Swiss franc, while they grew by only 0.7% in effective terms. By contrast, the weakening of the Swiss franc against the kuna in the first quarter of 2011 slightly reduced bank assets in nominal terms (0.3%). The ratio of bank assets to GDP, which grew from 114% to 118% in the course of 2010, fell slightly to 117% in the first quarter of 2011 under the influence of exchange rate movements (Figure 66).

Credit growth in 2010 was around 3.5% (after correction for exchange rate changes) and related almost entirely to the corporate sector,[3] while household loans slightly decreased in

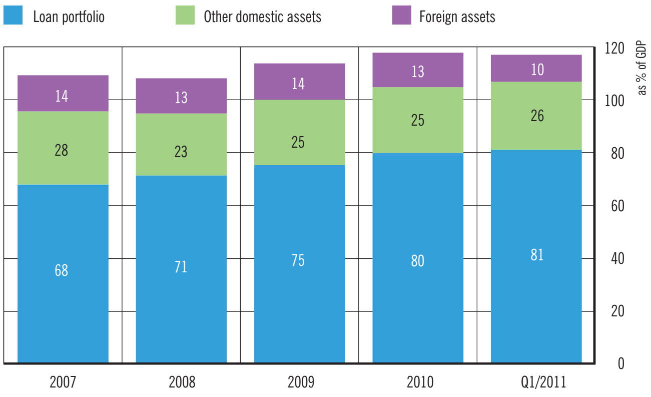
Figure 65 Major banking sector balance sheet items,[a] year-on-year rates of change



[a] An increase in balance-sheet items at end-March 2011 was calculated relative to March 2010.

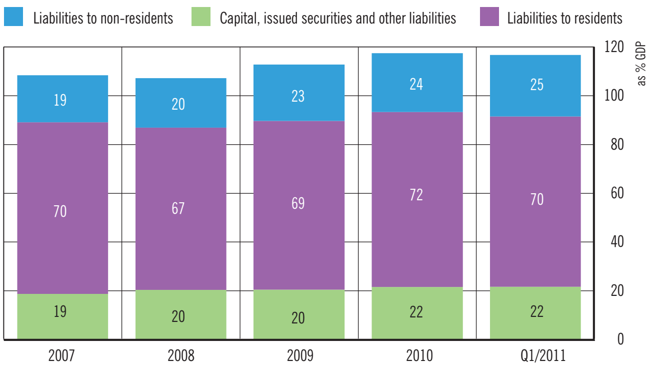
Source: CNB.

Figure 66 Banking sector assets



Source: CNB.

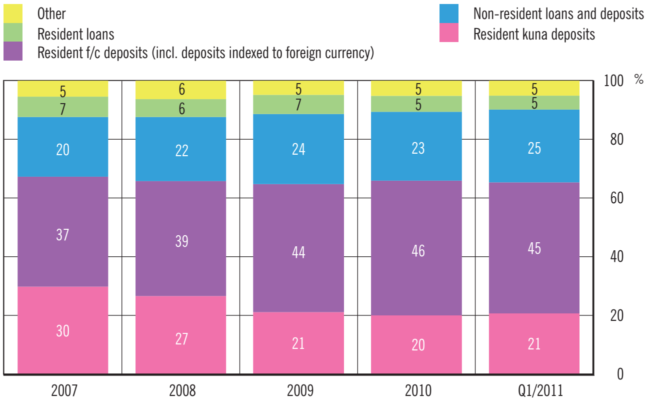
Figure 67 Banking sector liabilities[a]



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

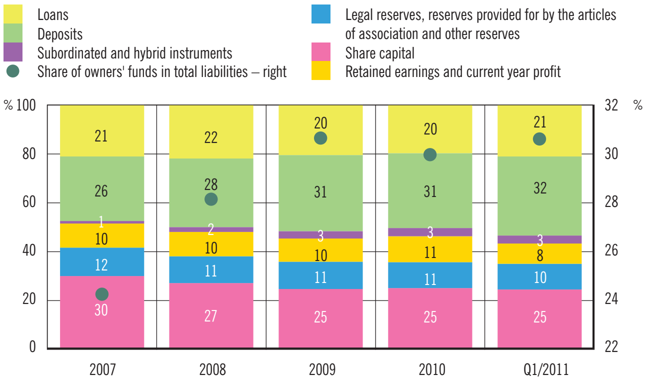
Source: CNB.

Figure 68 Structure of liabilities



Source: CNB.

Figure 69 Breakdown of bank owners' funds by instrument



Source: CNB.

effective terms.[4] In the first quarter of 2011, banks committed substantial funds for government loans (an increase of around 21%), which accounted for the bulk of credit growth in that period. This growth was financed by a reduction in some foreign asset items, i.e. deposits with foreign financial institutions and foreign securities (Figure 65). Still, in view of the still subdued demand for loans, banks have continued to hold a substantial kuna liquidity surplus.

The lowering of the rate of the minimum required foreign currency claims late in the observed period enabled banks to finance credit growth from previously accumulated funds, and thereby to cut down interest expenses.[5] Still, liquidation of some foreign assets somewhat reduced the banks' ability to amortise future disturbances in the environment that could affect their liquidity (Figure 70).[6]

In the course of 2010, banks stopped relying heavily on owners' funds. However, in late 2010 and early 2011, they again turned to the behavioural pattern that had marked the peak of the crisis (Figures 67, 68 and 69). Banks thereby compensated for the somewhat stronger outflows of corporate deposits that followed their strong growth in the third quarter of 2010. In the same period, household deposits continued to grow at a relatively stable pace, fluctuating slightly mainly due to exchange rate movements. In contrast to loans and deposits received from owners, the capitalisation level of the banking sector, measured as the share of capital in bank liabilities, continued to hold steady.

---

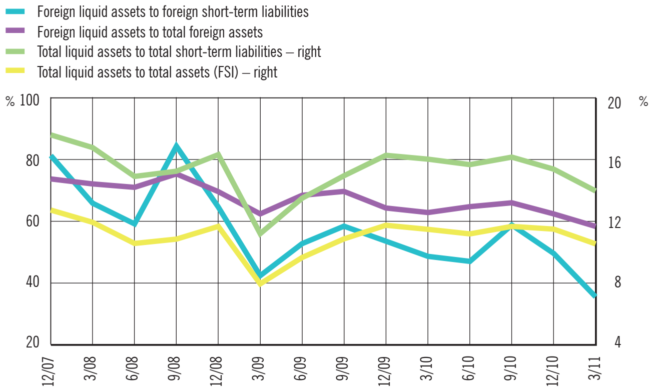
3 This increase was somewhat due to the reclassification of CM from the government sector to the corporate sector early in 2010.

4 The loan amount presented in bank statistical reports as at 31 March 2011 includes loans and, in some banks, debt securities held in the portfolio of loans and receivables. The value of loans and deposits is expressed in kuna, which means that exchange rate changes may decrease or increase non-kuna items. In 2010, the exchange rate significantly influenced nominal changes in balance sheet items as the kuna depreciated against the euro and the Swiss franc by around 1% and 21% respectively. The total increase in loans, without correction for exchange rate changes, was 5.3% in 2010, while housing loans grew by 9.5%. However, the rise in housing loans was entirely due to exchange rate effects as these loans account for the bulk of Swiss franc-indexed loans. In addition, in bank reports, the value of loans is presented on the net principle, i.e. the value of granted loans is reduced by the amount of value adjustments on these loans.

5 The reduction in the rate of the minimum required foreign currency claims from 20% to 17%, which came into effect in March 2011, freed up some HRK 6.3bn to banks.

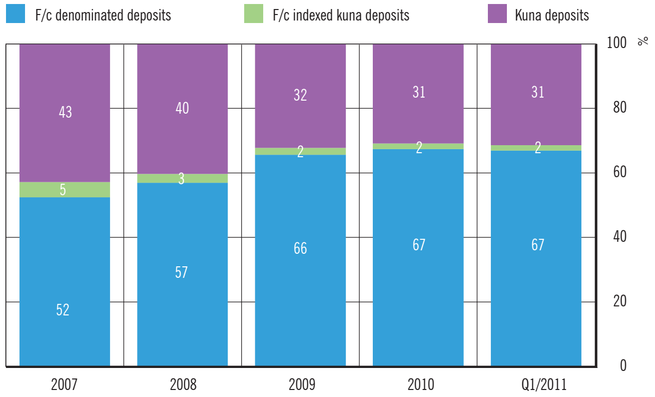
6 The Decision on liquidity risk management (OG 2/2010 and 73/2011) entered into force on 31 March 2010. This decision prescribes the minimum qualitative requirements for liquidity risk management and quantitative requirements for the purposes of reporting to the Croatian National Bank. Credit institutions are obliged to submit regular monthly reports on readily marketable assets, expected inflows and expected outflows, the minimum liquidity coefficient, the concentration of sources (if they account for more than 2% of total liabilities) and the form on behaviour assumptions if a credit institution uses its own assumptions. The minimum liquidity coefficient (MLC) is the ratio of cash inflows (readily marketable assets included) and cash outflows in two different time periods (up to one week and up to one month) and it must be higher than or equal to 1. Inflows and outflows, i.e. assets and liabilities are reported according to the estimated or remaining agreed maturity and do not represent the actual cash flow, but the cash flow under an acute short-term stress scenario specified by the CNB.

Figure 70 Liquidity indicators



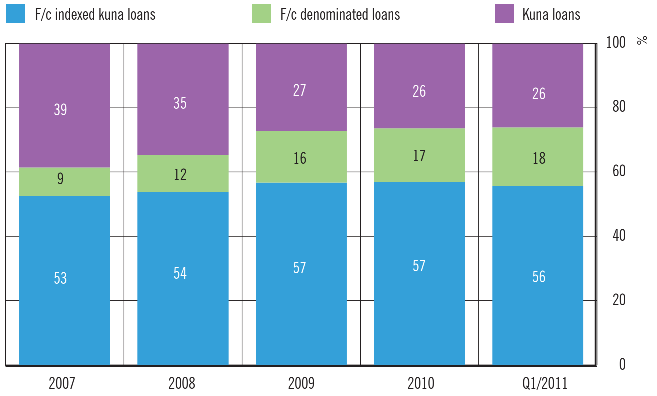
Source: CNB.

Figure 71 Currency breakdown of deposits



Source: CNB.

Figure 72 Currency breakdown of loans



Source: CNB.

This can be associated with a high level of unused capital and the expected slower credit growth relative to the pre-crisis period. The share of capital items in total exposure of parent banks to their subsidiaries was thus reduced to below one half, while the total share of owners in banks' sources of funding went up to 30.6% in the first quarter of 2011 (Figure 69).

Stronger use of non-resident funding sources in late 2010 and early 2011 raised the share of foreign currency sources in total banking sector assets. Following a brief improvement in corporate deposits in the third quarter of 2010, kuna and foreign currency corporate deposits decreased in the observed quarters. Coupled with the steady growth in household foreign currency deposits, this further raised the degree of euroisation on the liability side of bank balance sheets (Figure 71). On the asset side, the recovery of kuna loans continued slowly, so that the share of kuna loans stood at 26% in late 2010 and the first quarter of 2011 (Figure 72).

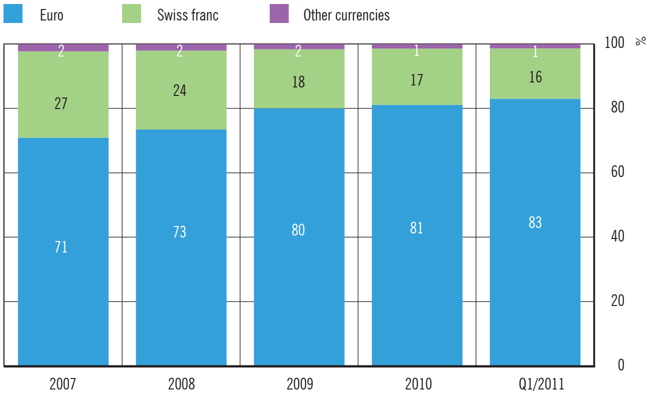
Within the structure of non-kuna loans, the downward trend in the share of Swiss franc-indexed loans, which began in 2007, continued and this share dropped to 16% in March 2011 (Figure 73). The share of these loans is still particularly large in car loans, primarily because of relatively low amounts of newly-granted loans for that purpose, while it has remained above 40% of housing loans due to the strengthening of the Swiss franc in recent years, as well as the long average maturity and slow growth in housing loans (Figure 74).

Although the long spot position in foreign currencies slightly increased in early 2011, banks increased their short forward position even more. Therefore, the overall net open foreign currency position of banks became short late in the first quarter of 2011, falling slightly in absolute terms, to 2.5% of own funds (Figure 75). Still, indirect exposure of banks to exchange rate risk continued to increase due to the growing euroisation of loans and relatively strong lending to unhedged construction activity in late 2010 and early 2011, coupled with somewhat slower lending to better-hedged corporations from the manufacturing. This lending structure increases the sensitivity of banks' loan quality to exchange rate fluctuations, particularly if one takes into account the serious deterioration in the loan quality recorded in construction, the activity to which banks are heavily exposed (Figure 76).

Banks have continued to transfer the entire interest rate risk, which is also systemically important, to their clients. However, a slight decline in the share of bank funds and assets with interest rate variable within a year was recorded in late 2010 and early 2011. By contrast, long-term loans have recovered slightly, thereby mitigating refinancing risk, which culminated in late 2009 when banks considerably shortened the maturity of newly-granted loans (Figures 77 and 86).

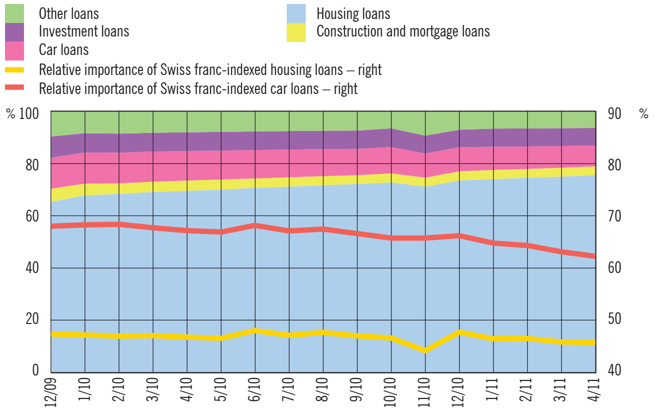
With the expected strengthening of economic activity and loan demand, as well as slower government borrowing in the domestic market, the high banking sector liquidity should create room to speed up corporate lending in the remainder of the year.

Figure 73 Currency breakdown of non-kuna loans



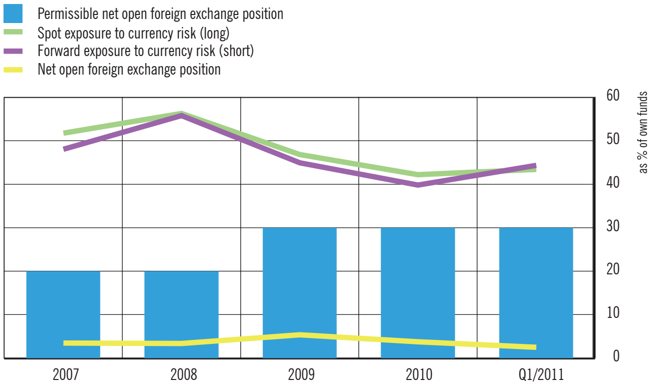
Source: CNB.

Figure 74 Breakdown of Swiss franc-indexed loans



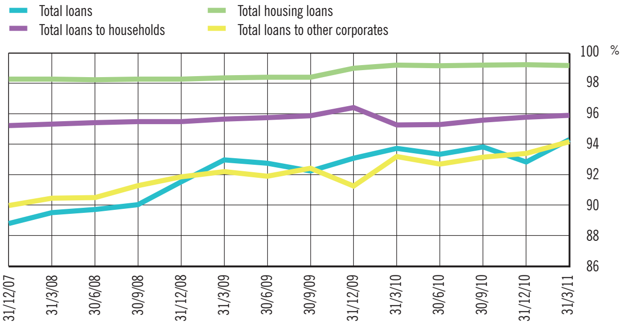
Source: CNB.

Figure 75 Bank exposure to currency risk



Source: CNB.

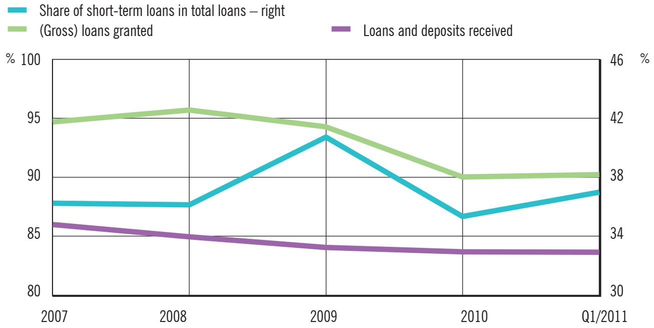
Figure 76 Share of unhedged loans in total loans exposed to CICR[a]



[a] Under new rules, CICR and several other risks have been transferred to the second pillar of the new framework of capital calculation, i.e. regulations on internal capital of credit institutions.

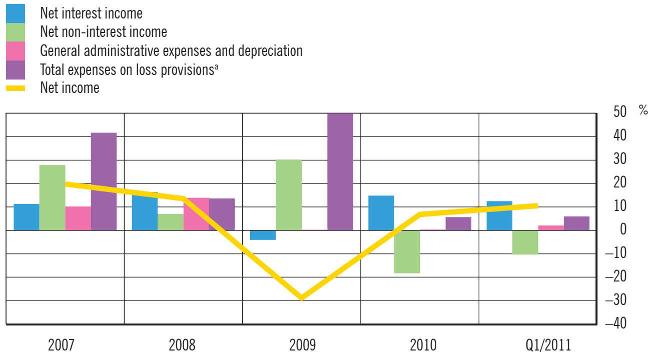
Source: CNB.

Figure 77 Share of (gross) loans and liabilities of banks with interest rate variable within one year in total gross loans and liabilities of banks and share of loans with remaining maturity shorter than one year



Source: CNB.

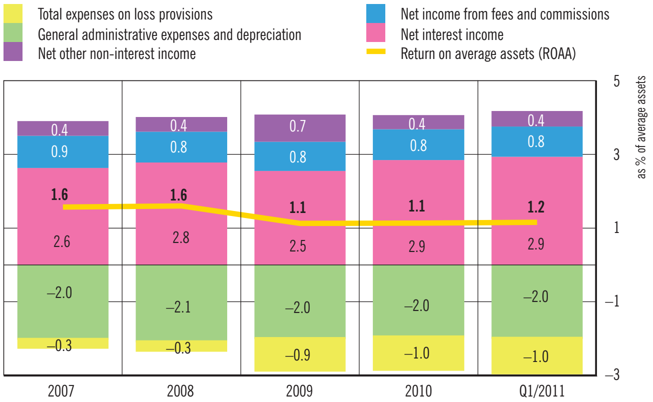
Figure 78 Change in selected business performance indicators, year-on-year rates of change



[a] Total expenses on loss provisions increased by around 220% in 2009.

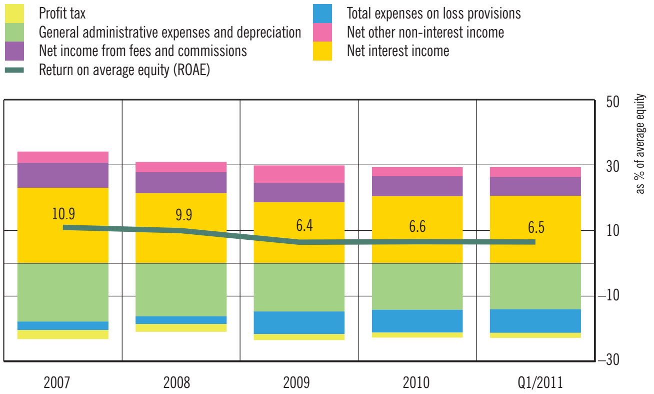
Source: CNB.

Figure 79 Contribution of ROAA categories



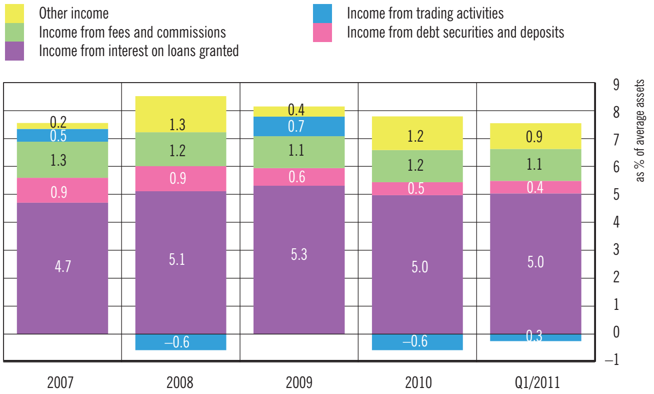
Source: CNB.

Figure 80 Contribution of ROAE categories



Source: CNB.

Figure 81 Structure of total income



Source: CNB.

Heavier reliance of banks on their parents, though reflecting parent banks' support in persistently difficult market conditions, increases dependence on parents' soundness and financial strength in the future. Should a parent bank face operating difficulties, this could undermine the liquidity of its local subsidiaries, particularly at the time of a reduction in foreign liquid assets of domestic banks (Figure 70).

Strategic risks[7]

Developments in late 2010 and early 2011 indicate that high expenses on loss provisions have continued to be the main constraint on banks' business results. After a hike in 2009 (of about 220%), these expenses grew slightly in 2010 and early 2011. By maintaining the interest margin at a high level and by steadily increasing the ratio of loans to assets (which reached a historical high of 69.9% in March 2011), which was made possible by regulatory changes in 2009 and 2010, banks gradually compensated for the negative impact of the loan portfolio deterioration on earnings in 2010 and early 2011. Coupled with stable administrative expenses and net non-interest income, this led to a slight increase in banks' net operating income (Figure 78).

Somewhat higher earnings and the parallel marginal increase in bank assets and capital slightly raised banks' profitability indicators relative to 2009.[8] In 2010 and in the period up to end-March 2011, return on average assets (ROAA) stood at 1.1% and 1.2% respectively, while return on average equity was 6.6% and 6.5% respectively, falling by about one-third from pre-crisis levels (Figures 79 and 80).

The gradual decline in lending rates, coupled with an increase in the share of long-term loans (which have lower interest rates) and the share of irrecoverable loans, slightly reduced the ratio of interest income to assets of banks in 2010 compared with the preceding year. This ratio stayed at the same level in early 2011 (Figure 81). As deposit rates declined somewhat faster than lending rates, the decrease in the ratio of interest expenses to bank assets was more intense, which slightly raised the interest margin in 2010 and early 2011 (Figures 83, 84 and 85). In addition to regulatory changes,[9] the drop in interest expenses of banks after 2009 was also due to developments in benchmark interest rates. In that period, ZIBOR fell to a historical low, while EURIBOR was stable at low levels. Owing to rising risk appetite in global financial markets and the decline in the coun-

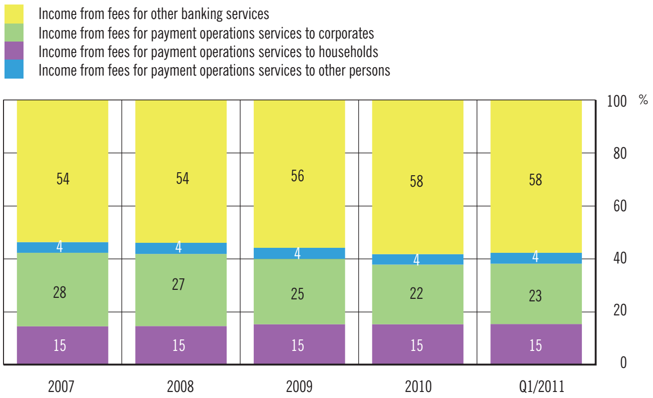
---

[7] Income statement items for March 2011 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 2010 and the first quarter of 2011.

[8] To a large extent, these developments were affected by one bank, which reported large losses at end-2009, while it operated at a profit in 2010 and early 2011.

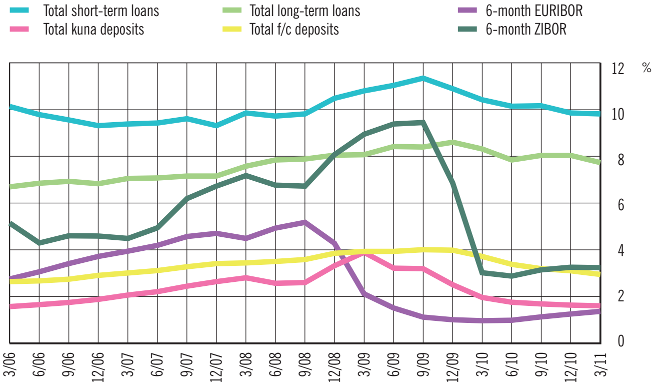
[9] In addition to the stated reduction in the rate of the minimum required foreign currency claims, the cut in the reserve requirement rate from 14% to 13% (which came into effect in February 2010), freed up around HRK 2.9bn to banks, which also led to a reduction in interest expenses.

Figure 82 Structure of income from fees and commissions



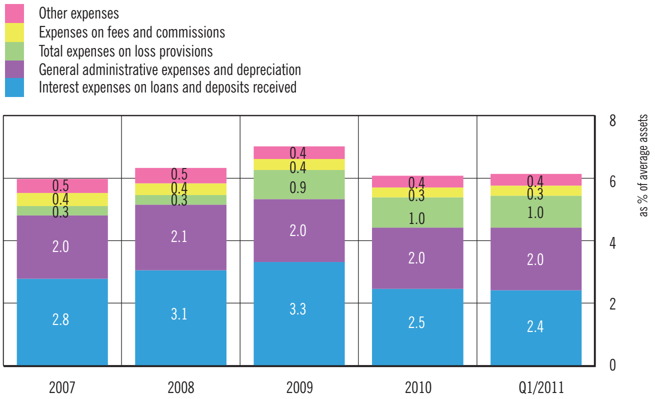
Source: CNB.

Figure 85 Selected interest rates (quarterly average of monthly interest rates)



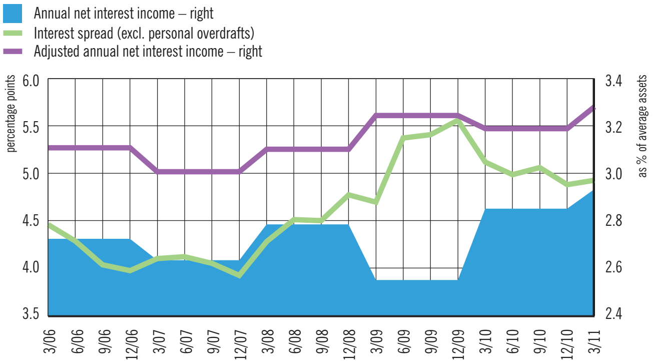
Source: CNB.

Figure 83 Structure of total expenses



Source: CNB.

Figure 84 Interest spread (quarterly average of monthly interest rates) and annual net interest income



Note: Net interest income of banks has been adjusted by income from trading activities and exchange rate differences.
Source: CNB.

try risk premium, foreign funding sources for banks became somewhat more abundant and less expensive than during the crisis (Figure 85).[10]

The downward tendency was transmitted to deposit rates faster than to lending rates. Combined with the rise in the ratio of loans to bank assets, this enabled banks to keep the interest margin at a high level throughout 2010 and to raise it even further in early 2011 (Figure 84). By contrast, as non-interest income depends strongly on economic activity, it was expected to stagnate. Banks compensated for the fall in income from fees for payment operations services by higher income from other banking services.[11] However, in a period of slow economic recovery, none of these income sources has significant growth potential (Figures 81 and 82). In the forthcoming period, banks are expected to continue with strict control of administrative expenses so as to improve cost efficiency and preserve earnings (Figures 78 and 83).

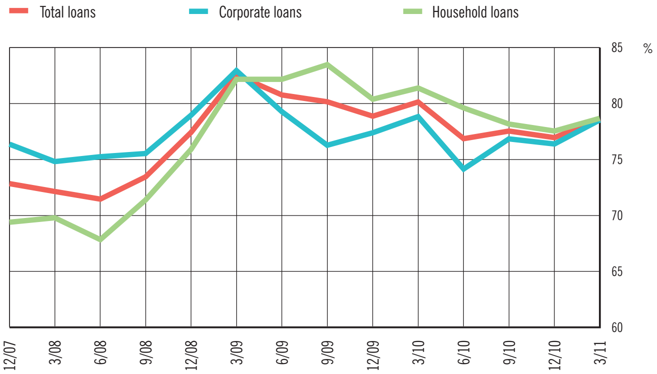
The maintenance of the high interest margin and cost control enabled a slight recovery in earnings, which have continued to be heavily influenced by a deterioration in the quality of bank assets. Charges for value adjustments will continue to be an important determinant of the business results of banks in the forthcoming period. Nevertheless, room for any further decrease in deposit rates has been significantly reduced. In conditions of a continuous slight downward trend in lending rates, the banks' ability to maintain the interest margin at a high level and thus support profits will depend on credit growth.

---

[10] The impact of ZIBOR on bank earnings in 2009 is explained in more detail in the Banking sector section of *Financial Stability*, No. 4, February 2010.

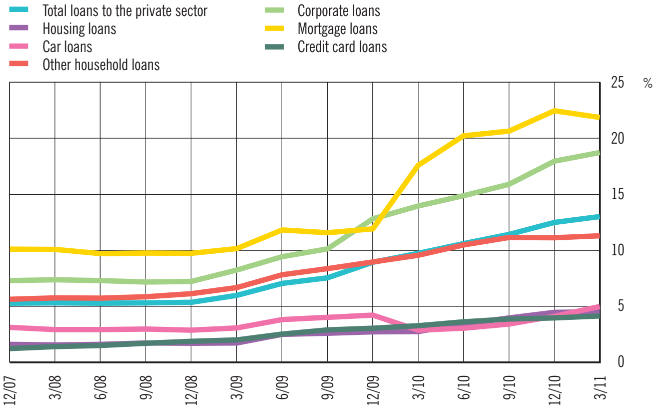
[11] Fees for: issuing guarantees or other commitments, mandated operations, safekeeping securities and security transactions in the name and for the account of other persons, safe custody services, keeping of deposit accounts, services of issuing and managing unused credit lines, consultancy and advisory services to clients, issuing and using bank credit cards, collecting credit card receivables from buyers when the bank does not keep these receivables in its books, and other services.

Figure 86 Share of short-term loans in total newly-granted loans (quarterly average)



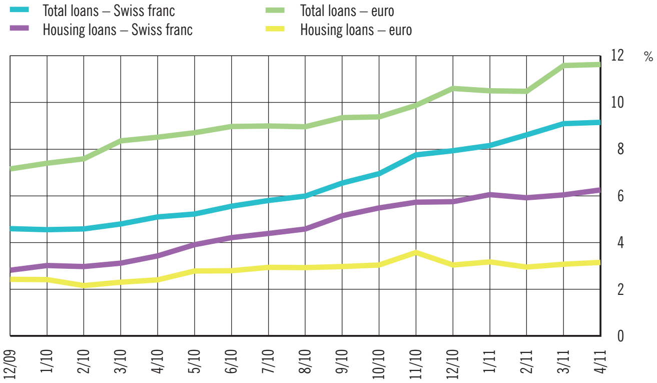
Source: CNB.

Figure 87 Ratio of non-performing loans to total loans



Source: CNB.

Figure 88 Ratio of non-performing loans to total loans by loan categories and the currency of indexation



Source: CNB.

Credit risk and bank capital adequacy

The quality of banks' loan portfolio continued to deteriorate in late 2010 and early 2011, albeit at a somewhat slower pace. The ratio of non-performing loans to total loans (NPLR) went up from 7.8% at the end of 2009 to 11.2% in late 2010 and to 11.5% at end-March 2011. A similar tendency was evident in the ratio of non-performing loans to total loans to the private sector; it grew from 8.9% to 12.5% from end-2009 to end-2010 and further to 13.0% in the first quarter of 2011 (Figure 87). Much slower growth in the ratio of total non-performing loans compared with loans granted to the private sector in early 2011 was largely a result of a sharp increase in loans to the government.[12]

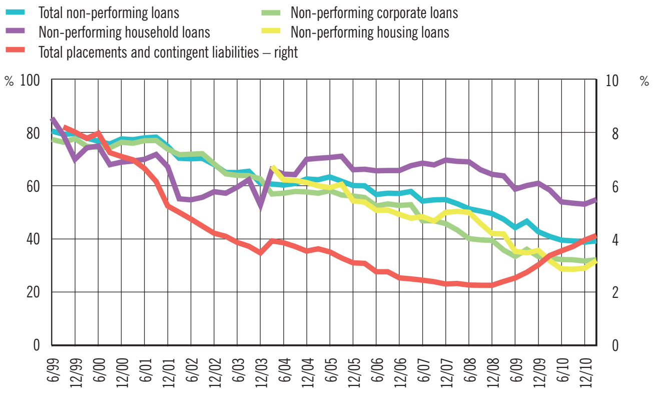
The quality of corporate loans continued to deteriorate relatively strongly, providing a major contribution to the increase in total non-performing loans in late 2010 and early 2011. The gradual deceleration of the fall in economic activity in 2010 somewhat mitigated the deterioration in the quality of corporate loans and led to a slower increase in total non-performing loans.

By contrast, the ratio of non-performing household loans to total household loans grew at a stable pace, which increased their contribution to the rise in total non-performing loans. A steady deterioration in the quality of these loans may be attributed to the continued worsening of the situation in the labour market and the strengthening of the Swiss franc against the kuna. The rise in NPLR was particularly evident in the segment of housing loans; it reached 4.5% at the end of the observed period, which is three times more than in the pre-crisis period. The largest contribution to the fall in the quality of housing loans was made by Swiss franc-indexed loans; NPLR for these loans reached 6.0% at the end of the observed period (NPLR for euro-indexed housing loans has held steady at 3.1% since mid-2010, Figure 88). The serious deterioration in the quality of Swiss franc-indexed housing loans was due to a combination of factors. The most important of them was the strong upward trend of the Swiss franc. In addition, at the peak of the crisis, interest rates on these loans grew somewhat more than those on loans indexed to other currencies. Furthermore, the average amount of Swiss franc-indexed loans is probably slightly larger

---

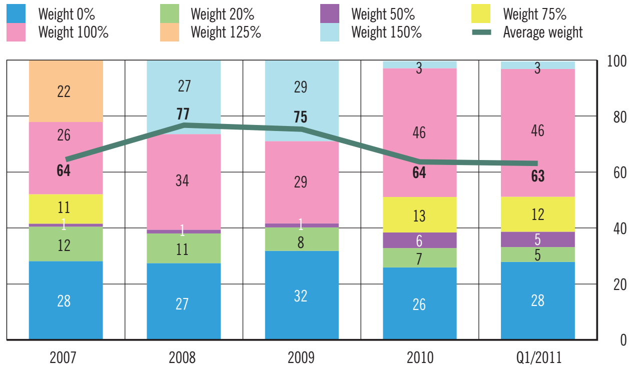
[12] New rules on the classification of placements and off-balance sheet liabilities have been in effect since 31 March 2010. The most relevant changes relate to the exclusion of the available-for-sale portfolio from placements subject to impairment provisions (value adjustments); the obligation to test for individual significant exposures arising from placements and off-balance sheet liabilities at the level of group of connected persons (for which credit institutions must assess credit risk on an individual basis); the definition of adequate instruments of collateral and the classification of placements not covered by adequate collateral into risk groups based primarily on a debtor's timeliness in settling liabilities; the option to recognise interest income from placements whose value has been reduced in the income statement even before their collection, etc. For the purpose of this analysis, placement classification by portfolio was presented in accordance with IAS 39. This presentation of placements by portfolio resulted in an important change and a break in the series of data on loans granted. Data on granted loans, which previously included loans (as instruments) and, in some banks, debt securities classified into the portfolio of loans and receivables, from 31 March 2010 onward include only the amount of loans in the portfolio of loans and receivables. The exclusion of the available-for-sale portfolio from the calculation of credit exposure contributed to a slight increase in the share of placements and off-balance sheet liabilities classified in groups B and C relative to the previous periods.

Figure 89 Coverage of total placements and contingent liabilities by value adjustments



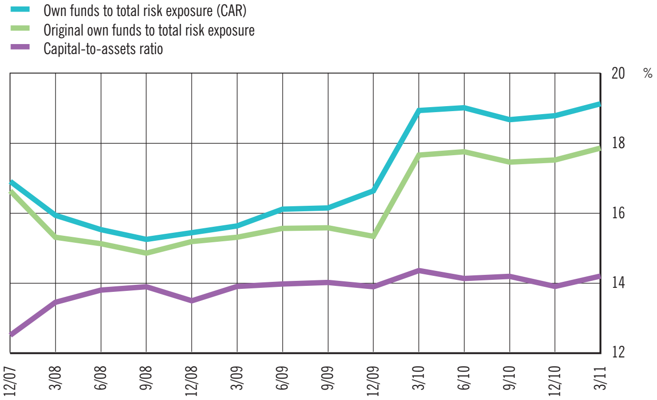
Source: CNB.

Figure 90 Distribution of bank assets by assigned weight and the average weight[a]



[a] Due to changes in the methodology, data before and after 2009 are not comparable.
Source: CNB.

Figure 91 Capital adequacy ratios



Source: CNB.

as most such loans were granted in the period of the strongest increase in real estate prices, while lower interest rates on such loans enabled the taking of larger loans in comparison with euro-indexed loans. All this is related to the potentially lower "financial margin" (income after loan repayment) of households with loans indexed to the Swiss franc.

The downward trend in the coverage of non-performing loans by value adjustments, which fell to an extreme low of 38.6% at end-2010, was interrupted in the first quarter of 2011, when the coverage grew slightly, to 39.3% (Figure 89).

The outbreak of the financial crisis further added to the fall in the coverage due to a strong inflow of new non-performing loans, classified mostly into categories with low average coverage. The ageing of the portfolio of non-performing loans, which banks will gradually transfer to categories with a higher coverage, could increase the average coverage in 2011. Therefore, charges for value adjustments could stay at a high level for some time and put pressure on bank earnings.

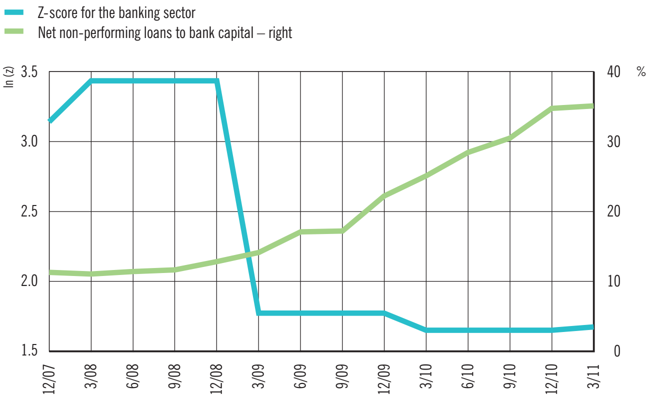
The expected further growth in NPLR and uncertainties regarding future value adjustments increase the importance of the other buffers (primarily capital) banks could use in case of a serious deterioration in the quality of their portfolio. Solvency indicators derived from the strength of available buffers suggest that the upward trend in the insolvency risk of the banking sector came to a halt for the first time since the onset of the financial crisis. The capital-to-assets ratio of banks has held steady at a relatively high level of around 14% since the beginning of 2009 (Figure 91) due to relatively low profits and larger profit payouts in conditions of stagnant assets. The relative capital buffer has also been stable since early 2009 despite the transition to Basel II. This transition led to a fall in the average risk weight applied to bank assets from 75% to 64% in 2010 because of the abolition of special risk weights on bank assets exposed to currency-induced credit risk. The fall in the average risk weight in early 2011 (to 63%) was further reinforced by the rise in the share of loans to the government sector, the risk weight on which is 0%. This also raised the capital adequacy ratio of the banking sector from 18.8% to 19.1% (Figures 90 and 91). However, the increase in the required minimum capital adequacy ratio from 10% to 12% at the beginning of 2010 and the parallel introduction of capital requirements for operational risk largely offset the impact of the lowering of the average weight for credit risk on the relative capital buffer.

The stabilisation of the coverage of non-performing loans in early 2011 stopped the increase in the burden put on banking sector capital by uncovered non-performing loans (the ratio of which was 35% in late 2010). Z-score, which is another indicator of the banking sector's solvency, plummeted in 2009 and decreased further at a slower pace in 2010, but recovered slightly in early 2011 due to somewhat less volatile earnings (Figure 92).[13]

---

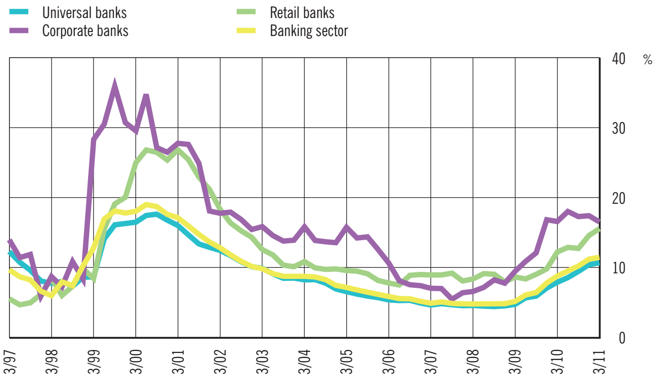
[13] For a more detailed description of Z-score see Box 5 Assessing banking sector stability in terms of Z-score, *Financial Stability*, No. 1, June 2008.

Figure 92 Solvency indicators of the banking sector



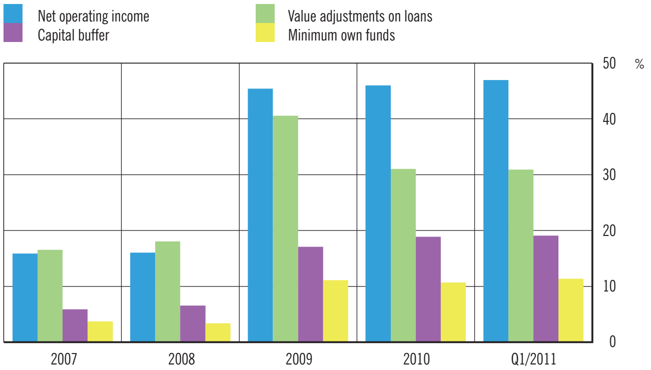
Source: CNB.

Figure 93 Dynamics of NPLR by bank groups



Source: CNB.

Figure 94 Relative importance of charges for value adjustments



Source: CNB.

Banking sector resilience

A deterioration in the quality of the aggregate credit portfolio continued in early 2011, albeit at a slower pace, largely due to the rise in the riskiness of placements by universal banks, which hold the bulk of banking sector assets. However, the quality of their loans has continued to be much better than in other bank groups. At the end of the first quarter of 2011, the NPLR for this bank group was 10.7%, while it was 11.5% for the entire banking sector, the highest level since the end of 2002. Banks concentrating on household loans also recorded an increase in the NPLR (to 15.5%), which came close to the NPLR of corporate banks (16.5%). The NPLR of the latter banks has held steady over the previous year, after growing sharply shortly after the crisis escalation in 2008 (Figure 93).

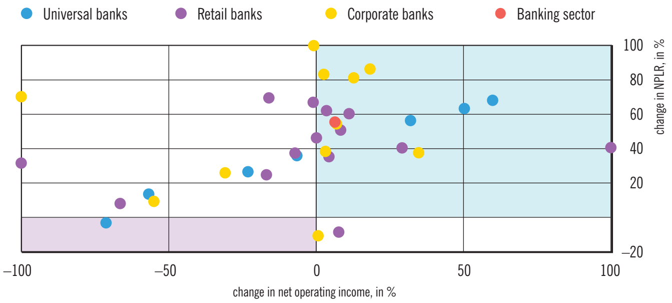
The materialisation of credit risk in the recessionary period heavily burdened the business results of banks. However, available buffers at an aggregate level have so far successfully absorbed the impact of the credit shock and thus protected bank capital (Figure 94).

Nevertheless, as there are considerable differences between individual banks, aggregate developments hide the fact that most banks recorded a fall in net income, while seven banks reported losses in the period up to March 2011. Compared with developments in the previous two years, only one (universal) bank assessed that the quality of its credit portfolio increased while its net income decreased. This means that banks previously assessed as risky under this criterion (mostly retail banks) have either began to assess the quality of their credit portfolios more conservatively or increased their operating income (Figure 95).

The rise in the coverage of non-performing loans in the first quarter of 2011 signals a reversal of the downward trend in the coverage that is to be expected in the forthcoming period (Figure 89). This means that the costs of value adjustments will probably continue to grow in the period to come despite the slower increase in non-performing loans. As a rule, banks substitute for a more optimistic assessment of the quality of placements by maintaining a higher coverage of non-performing loans by value adjustments. However, there is still a small group of (mostly retail) banks characterised by relatively low NPLR and coverage of total loans (the shaded area in Figure 96). These banks are particularly exposed to the risk of a future strong increase in value adjustments due to the ageing of the portfolio of existing non-performing loans (and their transition to groups of worse loans with a higher coverage) as well as inflows of new non-performing loans.

Additional value adjustments for existing non-performing loans that would increase their coverage to the average level in the 2003-2010 period (i.e. by 15 percentage points) would lower the capital adequacy ratio of the banking sector by 1.4 percentage points (Figure 97). This shock is only slightly milder than the impact of the shock scenario, which indicates that caution is warranted in interpreting the stress test results given below.

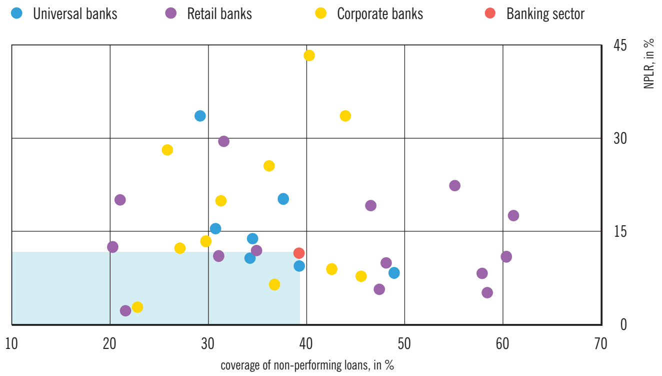
Figure 95 Change in bank earnings and NPLR in the first quarter of 2011 relative to the previous three years' average[a]



[a] The light blue shaded area shows banks with more solid business results and a more prudent risk assessment of the credit portfolio relative to the previous three years' average. The pink shaded area encompasses banks in which earnings declined but which made more optimistic assessments of their credit portfolio quality despite a deterioration in macroeconomic conditions.

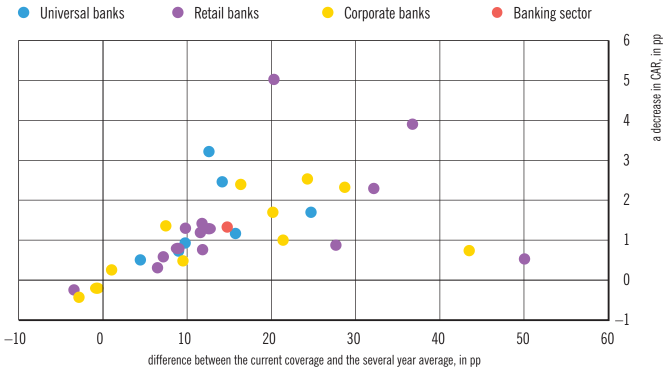
Source: CNB.

Figure 96 Coverage of non-performing loans by value adjustments and NPLR by bank groups, as at 31/3/2011



Source: CNB.

Figure 97 Adjustment of the CAR as at 31/3/2011 by the fall in the coverage of non-performing loans relative to the average (2003–2010)



Source: CNB.

The number of banks characterised by higher interest rates on average deposits and the decline in profitability also decreased compared with 2009 and 2010, which means that the risk of moral hazard has been somewhat reduced, while earnings of the most risky banks have improved. This problem is mostly associated with retail banks, which have been recording the fastest increase in NPLR since mid-2009 (Figure 98).

The stress tests conducted rely on sectoral models of credit risk that enable a simulation of the impact of macroeconomic shocks on changes in riskiness of individual loan groups (see Box 5 Credit risk models for specific bank portfolios). Thereby, the impact of the macroeconomic scenario on each bank is manifested depending on the structure of its credit portfolio (corporate, housing and consumer loans and other loans).

The baseline scenario, in other words the most likely outcome, assumes a 1.0% increase in real GDP in 2011 and the maintenance of a relatively stable exchange rate of the kuna versus the euro. The shock scenario, which represents stress testing for a highly unlikely but plausible combination of shocks, simulates the impact of much more unfavourable economic developments; in addition to a 0.5% GDP decline in 2011, it also implies a 10% depreciation of the exchange rate of the kuna against the euro (Figure 99).

A detailed projection of the non-performing loan dynamics by the end of 2011 was made possible by an improved analytical framework and the described assumptions on macroeconomic developments. Under the baseline scenario, which assumes economic recovery and the maintenance of a stable exchange rate in the remainder of 2011, the NPLR could reach around 14% by the end of the year. Assuming that the economic recovery projected in the baseline scenario continues, NPLR growth is expected to slow down further in 2012. Under the stress scenario, the NPLR would grow by some 74% in 2011, to around 20% at the end of the year (Figure 100).

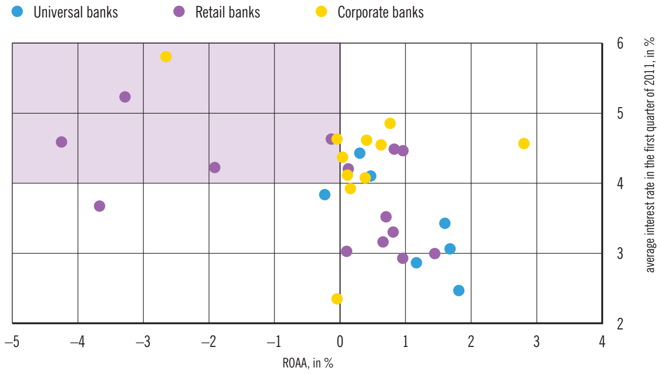
The corporate loan portfolio has continued to make the largest contribution to the described dynamics of non-performing loans. Under the baseline (shock) scenario, the share of non-performing corporate loans will exceed 23% (37%) on 31 December 2011. A somewhat smaller increase in the risk is associated with consumer loans, where the share of non-performing loans under the baseline and shock scenarios reaches 11% and 12%, respectively. The share of non-performing housing loans would grow mildly under the baseline scenario, to 5.3%, and to 8.3% under the shock scenario. The remaining portfolio, which relates to loans to the government (most loans) and non-residents, also shows an increase in risk (Figures 101 and 102).

Under the baseline scenario, net income of banks[14] should

---

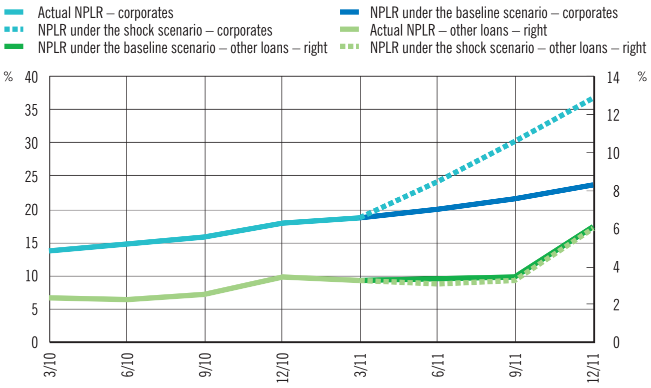
[14] Net income of banks projected by the internal model based on banks' business performance in the first three months of 2011 and developments in interest rates and balance sheet items expected in the remainder of the year. Under the baseline scenario, net income of the banking sector in 2011 corresponds to that realised in 2010, while this buffer falls by 20% under the shock scenario.

Figure 98 ROAA in 2010 and average interest rate on f/c deposits in the first quarter of 2011



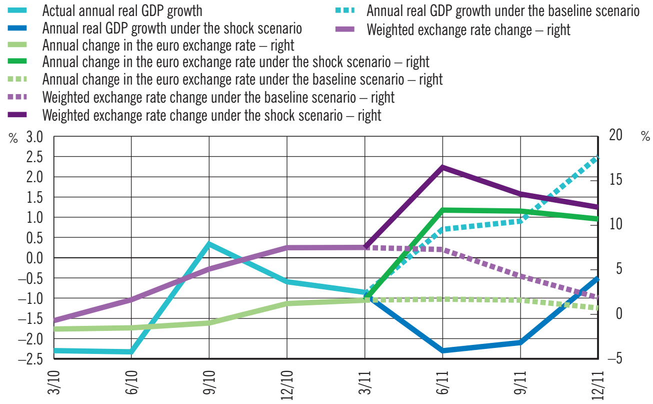
Source: CNB.

Figure 101 Projections of non-performing loans to corporates and other loans under various scenarios



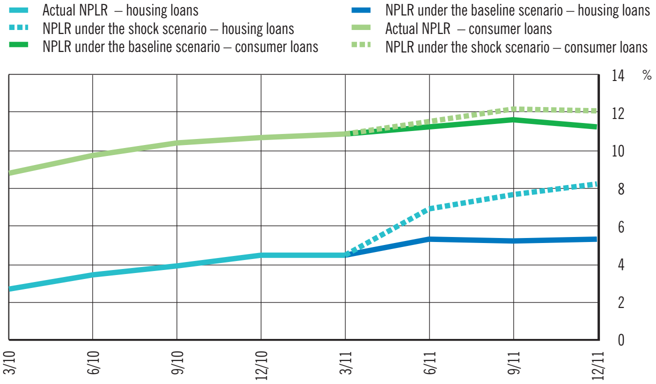
Source: CNB.

Figure 99 Projections of macroeconomic variables under various scenarios



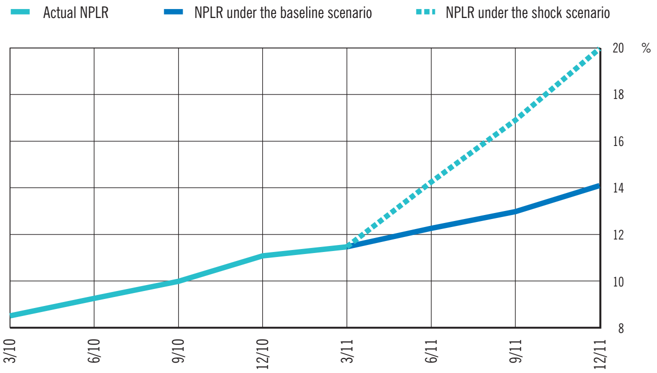
Source: CNB.

Figure 102 Projections of non-performing housing and consumer loans under various scenarios



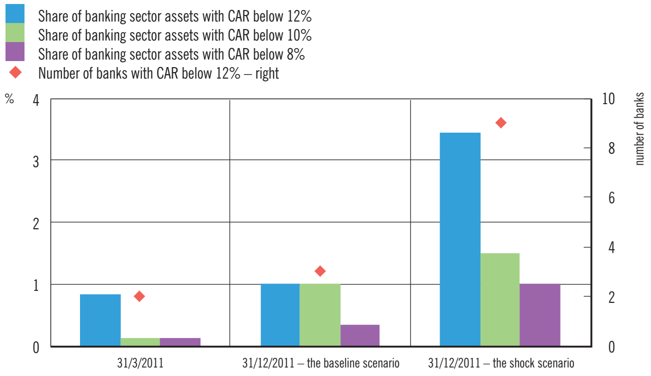
Source: CNB.

Figure 100 Projections of NPLR under various scenarios



Source: CNB.

Figure 103 Breakdown of banks and their assets by CAR under various scenarios for 2011



Source: CNB.

Table 5 Dynamics of NPLR and CAR under various scenarios by bank groups

	31/3/2011	31/12/2011			
		Baseline scenario		Shock scenario	
	CAR (%)	CAR (%)	CAR relative to 31/3/2011	CAR (%)	CAR relative to 31/3/2011
Banking sector	19.1	21.1	2.0	17.4	–1.7
Retail banks	16.0	16.6	0.5	13.6	–2.5
Corporate banks	15.9	15.9	0.0	12.8	–3.1
Universal banks	19.5	21.8	2.2	17.9	–1.6

Source: CNB.

continue to be more than sufficient to absorb overall expenses on value adjustments, so that, assuming that earnings are reinvested, the capital adequacy ratio of the banking sector would grow by 2 percentage points relative to 2010. This mostly refers to large universal banks. The aggregate net income of retail banks is only marginally higher than projected charges for value adjustments, which implies that their capital adequacy ratio would increase slightly. The net income of corporate banks would cover charges for value adjustments, which implies that their capital adequacy ratio would remain unchanged (Table 5).

As in previous stress tests, a much sharper NPLR increase under the shock scenario is considered in parallel with lower projected bank earnings and the direct impact of any kuna weakening, which will automatically bring about a decrease in the capital adequacy ratio as banks' capital is expressed in kuna, while their assets are predominately denominated in euro. The total decline in the capital adequacy ratio (CAR) under that scenario would be 1.7 percentage points by the end of 2011; the CAR of universal, corporate and retail banks would fall by 1.6 percentage points, 3.1 percentage points and 2.5 percentage points respectively. However, even under that scenario, the sector as a whole would stay well capitalised and its CAR would stand at 17.4% at the end of 2011.

Under the shock scenario, by end-2011, the CAR would fall below 12% for 9 banks holding around 3.5% of banking sector assets and below 8% for three banks holding around 1.5% of bank assets (Figure 103).[15]

---

[15] All these projections are based on the assumption that banks raise no additional capital in the period under review.

Box 5 Credit risk models for specific bank portfolios

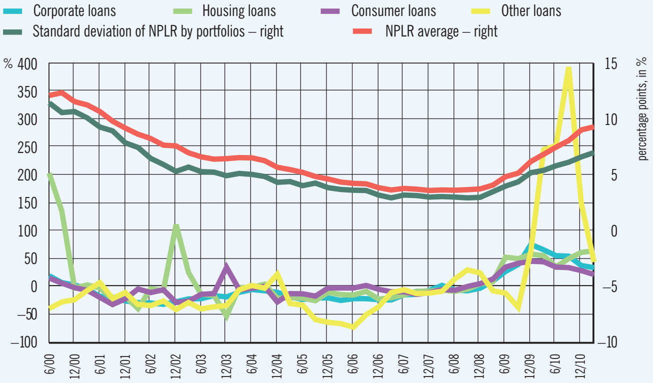
The components of Croatian banks' credit portfolio showed considerably different deterioration dynamics after the outbreak of the crisis. The quality of corporate loans deteriorated rapidly and sharply, while the deterioration of the household credit portfolio was delayed, and in the case of some loan types to some extent depended on their specific characteristics. The differences in the dynamics of non-performing loans increased the dispersion of loan quality across subportfolios (Figure 1), with the result that banks' performance also diverged, depending on their business orientation and the quality of the risk management process.

Specific banks' reactions to macroeconomic shocks have so far been taken into account to some extent in the context of the banking sector stress testing through the use of credit risk models estimated for specific strategic bank groups. Banks have been classified into strategic groups depending on the adopted business models, which also determine their asset and liability structure. This analysis assesses credit risk models for specific credit portfolio components in order to take into account, in stress testing, changes in the portfolio structure occurring in the course of time and better adjust each bank's results with its risk profile and shock sensitivity.

For the purpose of modelling the share of non-performing loans, the banking sector portfolio was split into two categories of household loans (housing loans and consumer loans, which cover all non-housing loans to households) corporate loans and other loans. Their shares in the total credit portfolio were 21%, 23%, 38% and 18% respectively at the end of March 2011.[1] The independent variable in the models estimated for each portfolio is the change in credit risk indicator obtained by the continued transformation of the share of non-performing loans in a specific loan category.[2] Explanatory macroeconomic variables that have proved significant in the models estimated for individual portfolios are the same as those employed in the previously used aggregate risk model: a change in real GDP (in the current and past period) and change in the nominal kuna/euro exchange rate, with a different specific combination of variables for each estimated model.[3] The annual rates of change in the dependent variable and independent variables used in the estimations, due to the somewhat higher volatility of the share of non-performing loans in individual portfolios than for the aggregate indicator, show better characteristics in the estimated models than quarterly rates of change. The inclusion of a dependent variable with a time lag into estimated models also increases the model's explanatory power.

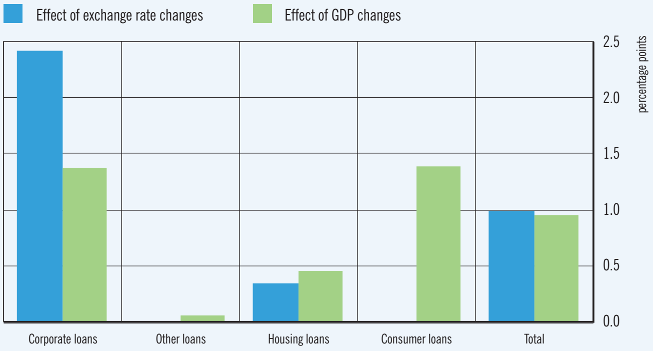
The estimated sensitivity of the shares of non-performing loans to macroeconomic shocks differs considerably among individual credit portfolios (Figure 2), which justifies the sectoral approach to credit risk modelling. The economic slowdown makes the strongest impact on the share of non-performing loans in total corporate loans. The estimated reaction of non-performing consumer loans is somewhat more moderate than that of non-performing corporate loans, while the quality of housing loans is relatively resistant to the economic slowdown. The weakening of the kuna exchange rate, according to estimated models, also has a relatively strong impact on the deterioration of the corporate credit portfolio, with the intensity of the effect of a 1% depreciation on non-performing loans in that portfolio segment being almost twice as strong as that of the effect of a 1 percentage point GDP slowdown. The exchange rate depreciation also produces an effect on the deterioration of the housing loan portfolio, the intensity of which is close to that of the effect of the economic slowdown on the share of non-performing loans in total housing loans. Exchange rate changes produce no significant statistical effect on consumer loans, which may be attributed

Figure 1 Change in NPLR by loan groups



Source: CNB.

Figure 2 Cumulative effect of the annual kuna exchange rate growth of 1% and the slowdown in the annual GDP growth of 1 percentage point on NPLR by portfolios



Source: CNB.

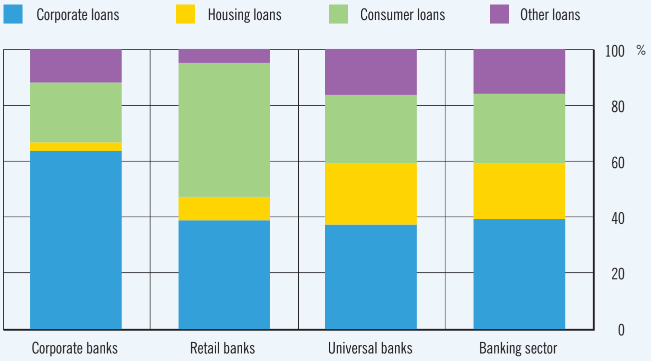
---

[1] The portfolio of other loans mainly comprises government loans (over 80%) that are considered the least risky.

[2] This procedure uses a transformation widely exploited in literature on credit risk modelling: $y_{it} = ln(1/PD_{it} - 1)$ where PD is the share of non-performing loans for portfolio *i* in period *t*, while *y* is a transformed variable.

[3] In addition to real GDP and the exchange rate, a series of variables was also tested: indicators of unemployment and available household income as well as various interest rates.

Figure 3 Breakdown of bank portfolios by strategic groups, as at 31/3/2011



Source: CNB.

to a slightly higher frequency of kuna loans in that portfolio that in the housing loan portfolio. Other loans have a relatively weak reaction to macroeconomic shocks. A one percentage point slowdown in economic growth increases the aggregate share of non-performing loans in the overall credit portfolio approximately by one percentage point, which is equal to the effect of a 1% depreciation in the exchange rate. These elasticities of non-performing loans on the aggregate level are relatively similar to those previously estimated in the aggregate model.

The estimated differences in the elasticities of the share of non-performing loans to a large extent explain the differences in its dynamics among strategic bank groups. It is therefore not surprising that corporate and retail banks are more sensitive to macroeconomic shocks due to exposure to corporate and consumer loans. In contrast, a considerable share of relatively weakly sensitive housing loans in the assets of universal banks contributes to the stability of the share of non-performing loans in that group of banks (Figure 3).

The presented elasticities of the share of non-performing loans across the portfolios should be interpreted with some qualifications. First of all, exchange rate fluctuations in the period from mid-1999 covered by data on loan quality per specific portfolios have been weaker than in a somewhat longer period comprised by the aggregate macroeconomic model of credit risk. More pronounced exchange rate fluctuations are recorded only by the housing loan portfolio, where a specific model was estimated using changes in the exchange rate of the euro and Swiss franc, weighted by their shares in housing loans for each specific period, which enabled an approximation of the effective exchange rate for housing loan users. Finally, the sensitivity of non-performing loans to macroeconomic shocks depends on the levels of observed variables so that the reaction of non-performing loans under a specific scenario may differ somewhat from the presented elasticities estimated at the average levels of dependent and independent variables.

The practice of transferring macroeconomic shocks to banks' balance sheets has remained basically unchanged from earlier stress tests, which means that additional value adjustment costs are formed in proportion to the existing level of coverage of non-performing loans. However, new models provide for the design of separate projections for each observed portfolio segment. Therefore a projection of trends in total non-performing loans for each individual bank now also depends on the particular structure of its portfolio. In addition, banks that have proved to be more exposed to credit risk also show stronger absolute growth of the share of non-performing loans in the projection horizon because of lagged dependent variables and the projections of relative changes in non-performing loans used in the estimated models. This takes into account the fact that each bank has a specific risk profile within the observed portfolio.

The assessments of elasticity of the share of non-performing loans for the overall credit portfolio approximately correspond with earlier assessments based on the macroeconomic model of credit risk, so that the change in the methodology does not lead to significantly different aggregate projections within banking sector stress testing. However, the described methodological changes should lead to a more detailed insight into the risks inherent in specific credit portfolio components and generate improved estimations of the resilience of each individual bank.

List of figures and tables

Figure 1 Financial stability map 7
Table 1 Economic growth, exports and industrial production in selected developed and emerging market countries 11
Figure 2 Business and consumer confidence indices 11
Figure 3 Key interest rates of the main central banks and leading market interest rates 12
Figure 4 CDS spreads for 5-year bonds of selected eurozone countries 12
Figure 5 CDS spreads for 5-year bonds of selected banks 12
Table 2 Fiscal balance and current account balance in selected developed and emerging market countries 12
Figure 6 CDS spreads for 5-year bonds of selected emerging market countries 13
Figure 7 EMBI spreads 13
Figure 8 Yields on Croatian and benchmark German bonds maturing in 2014 and their spread 13
Table 3 Public and external debt in selected European emerging market countries 13
Figure 9 Capital inflows to European emerging market countries 14
Figure 10 Foreign capital inflows and GDP growth in Croatia 14
Figure 11 GDP growth pattern (contribution to growth) 14
Figure 12 Savings and investment – total and by sector 15
Figure 13 External debt by domestic institutional sector 15
Figure 14 Total external debt by creditor 15
Figure 15 Short-term external debt 15
Figure 16 Selected indicators of external vulnerability 15
Figure 17 Projection of external debt principal payments in 2011 by sectors 15
Figure 18 Optimal international reserves – contribution of individual components 16
Figure 19 Real kuna/euro exchange rate 16
Figure 20 Unit labour cost 16
Figure 21 Total debt by sector 16
Figure 22 Net position of domestic sectors with respect to the rest of the world by instrument 16
Figure 23 Net financial position of selected domestic sectors with respect to the rest of the world by equity and debt instrument 16
Figure 24 Estimated credit demand and supply in the domestic market 17
Figure 25 Estimated demand for and supply of foreign loans 17
Figure 26 Kuna/euro exchange rate and overnight interest rates 17
Figure 27 Gross domestic product, seasonally adjusted data in constant prices 17
Figure 28 Changes in employment registered with the Croatian Employment Service (CES) 17
Figure 29 General government debt 19
Figure 30 General government deficit 19
Figure 31 Public debt 20
Figure 32 Breakdown of public debt by remaining maturity 20
Figure 33 Currency breakdown of public debt 20
Table 4 Thresholds of the fiscal sustainability risk indicator in 2011 20
Figure 34 Yield on primary issue of euro securities 21
Figure 35 Projection of general government deficit 21
Figure 36 Projection of general government debt 21
Figure 37 Gross financing needs 22
Figure 38 Projection of public debt under various scenarios 22

Box 1

Table 1 Inter-sector claims and liabilities at end-2009 and end-2010 24

Box 2

Figure 1 Interest rates on f/c denominated loans to corporates 25
Figure 2 Spread between interest rates on corporate loans and 6-month EURIBOR increased by the yield spread on government bonds 25
Table 1 Unit root tests 26
Figure 39 Household debt 27
Figure 40 Employment and wages (seasonally adjusted) 27
Figure 41 Maturity breakdown of newly-granted household loans, adjusted by seasonal fluctuations 28
Figure 42 Newly-granted long-term household loans by purpose, adjusted by seasonal fluctuations 28
Figure 43 Household loans by purpose 28
Figure 44 Household debt and debt burden 29
Figure 45 Household financial assets 29
Figure 46 Currency breakdown of household loans 29
Figure 47 Household loans by interest rate variability 29

Box 3

Figure 1 Loan demand probability 30
Figure 2 Loan approval probability 30
Figure 3 Contribution of bank credit policies and household creditworthiness to the change in credit limits between 2008 and 2009 31
Figure 4 Use of available credit limits 31
Figure 48 Annual growth of domestic loans and external debt of the real estate sector, adjusted by exchange rate changes 33
Figure 49 Housing loans and HREPI on a quarterly basis 33
Figure 50 Comparison of interest rates on housing loans in Croatia and the eurozone 34
Figure 51 Financial availability of residential property 34
Figure 52 Change and non-financial corporate debt stock 35
Figure 53 Annual growth rate of non-financial corporate debt 35
Figure 54 Non-financial corporate debt 36

Figure 55 Newly-granted bank loans and absolute change in the stock of gross loans 36
Figure 56 External debt allocation by sectors from September 2010 to March 2011 36
Figure 57 Allocation of domestic bank loans by sectors from September 2010 to March 2011 37
Figure 58 Breakdown of newly-granted loans to non-financial corporations by maturity and currency 37
Figure 59 Currency exposure in March 2011 37
Figure 60 Share of corporate non-kuna debta in total loans 37
Figure 61 Breakdown of bank loans to non-financial corporations by interest rate variability 37
Figure 62 Interest rates on long-term loans to non-financial corporations in Croatia and the eurozone 37
Figure 63 Interest rates on short-term loans to non-financial corporations in Croatia and the eurozone 38
Figure 64 Ratio of transaction account deposits of non-financial corporations to gross value added 38

Box 4

Figure 1 Two ways of integration of macroeconomic shocks into the micro model of corporate credit risk 39
Table 1 Panel regression results 40
Table 2 Estimated contributions of individual macroeconomic variables to the changes in default probability 40
Figure 2 Projection of changes in the average of financial indicators based on the baseline scenario macro model (all variables are shown as basis indices, 1998 = 100) 41
Figure 3 Dynamics of changes in the estimated average probability of default 41
Figure 65 Major banking sector balance sheet items, year-on-year rates of change 42
Figure 66 Banking sector assets 42
Figure 67 Banking sector liabilities 43
Figure 68 Structure of liabilities 43
Figure 69 Breakdown of bank owners' funds by instrument 43
Figure 70 Liquidity indicators 44
Figure 71 Currency breakdown of deposits 44
Figure 72 Currency breakdown of loans 44
Figure 73 Currency breakdown of non-kuna loans 45
Figure 74 Breakdown of Swiss franc-indexed loans 45
Figure 75 Bank exposure to currency risk 45
Figure 76 Share of unhedged loans in total loans exposed to CICR 45
Figure 77 Share of (gross) loans and liabilities of banks with interest rate variable within one year in total gross loans and liabilities of banks and share of loans with remaining maturity shorter than one year 45
Figure 78 Change in selected business performance indicators, year-on-year rates of change 45
Figure 79 Contribution of ROAA categories 46
Figure 80 Contribution of ROAE categories 46
Figure 81 Structure of total income 46
Figure 82 Structure of income from fees and commissions 47
Figure 83 Structure of total expenses 47
Figure 84 Interest spread (quarterly average of monthly interest rates) and annual net interest income 47
Figure 85 Selected interest rates (quarterly average of monthly interest rates) 47
Figure 86 Share of short-term loans in total newly-granted loans (quarterly average) 48
Figure 87 Ratio of non-performing loans to total loans 48
Figure 88 Ratio of non-performing loans to total loans by loan categories and the currency of indexation 48
Figure 89 Coverage of total placements and contingent liabilities by value adjustments 49
Figure 90 Distribution of bank assets by assigned weight and the average weight 49
Figure 91 Capital adequacy ratios 49
Figure 92 Solvency indicators of the banking sector 50
Figure 93 Dynamics of NPLR by bank groups 50
Figure 94 Relative importance of charges for value adjustments 50
Figure 95 Change in bank earnings and NPLR in the first quarter of 2011 relative to the previous three years' average 51
Figure 96 Coverage of non-performing loans by value adjustments and NPLR by bank groups, as at 31/3/2011 51
Figure 97 Adjustment of the CAR as at 31/3/2011 by the fall in the coverage of non-performing loans relative to the average (2003–2010) 51
Figure 98 ROAA in 2010 and average interest rate on f/c deposits in the first quarter of 2011 52
Figure 99 Projections of macroeconomic variables under various scenarios 52
Figure 100 Projections of NPLR under various scenarios 52
Figure 101 Projections of non-performing loans to corporates and other loans under various scenarios 52
Figure 102 Projections of non-performing housing and consumer loans under various scenarios 52
Figure 103 Breakdown of banks and their assets by CAR under various scenarios for 2011 52
Table 5 Dynamics of NPLR and CAR under various scenarios by bank groups 53

Box 5

Figure 1 Change in NPLR by loan groups 54
Figure 2 Cumulative effect of the annual kuna exchange rate growth of 1% and the slowdown in the annual GDP growth of 1 percentage point on NPLR by portfolios 54
Figure 3 Breakdown of bank portfolios by strategic groups, as at 31/3/2011 55

Abbreviations and Symbols

Abbreviations

bn – billion
CAR – capital adequacy ratio
CBS – Central Bureau of Statistics
CDCC – Central Depository & Clearing Company
CDS – credit default swap
CEE – Central and Eastern European
CES – Croatian Employment Service
CICR – currency-induced credit risk
CNB – Croatian National Bank
EAD – exposure at default
EBA – European Banking Authority
ECB – European Central Bank
EFSF – European Financial Stability Facility
EIZG – Institute of Economics, Zagreb
EMBI – Emerging Market Bond Index
EMU – Economic and Monetary Union
EONIA – Euro Overnight Index Average
ERM – Exchange Rate Mechanism
ESM – European Stability Mechanism
EU – European Union
EULIBOR – Euro London Interbank Offered Rate
EUR – euro
EURIBOR – Euro Interbank Offered Rate
f/c – foreign currency
FDI – foreign direct investment
Fed – Federal Reserve System
FINA – Financial Agency
FRA – Fiscal Responsibility Act
FSI – financial soundness indicators
GDP – gross domestic product
GFS – Government Finance Statistics
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
NPLR – ratio of non-performing loans to total loans
OECD – Organisation for Economic Co-operation and Development
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
RR – reserve requirements
SDR – special drawing rights
yoy – year-on-year
ZIBOR – Zagreb Interbank Offered Rate
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 (print) • ISSN 1847-0017 (online)

ISSN 1846-9264 (print) • ISSN 1847-0017 (online)