

No.

16

Year 9  
II 2016



# FINANCIAL STABILITY

CROATIAN NATIONAL BANK



CROATIAN NATIONAL BANK

# Financial Stability

No. 16, Zagreb, February 2016

**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

[www.hnb.hr](http://www.hnb.hr)

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

ISSN 1847-0017 (online)

## Contents

Introductory remarks	5
Overall assessment of the main risks and challenges to financial stability policy	7
Macroeconomic environment	9
Box 1 An overview of macroprudential policies in EU member states and in Norway	17
Government sector	21
Box 2 Shadow banking in Croatia	25
Household sector	30
Box 3 Preliminary measurements of the deposit concentration risk	35
Real estate	38
Non-financial corporate sector	40
Box 4 Cost of bank capital	46
Banking sector	49
Box 5 International comparisons of bank profitability	57
Stress testing of credit institutions	59



# Introductory remarks

Finance plays a key role in the allocation of resources, i.e. the process of transforming savings into investments, and therefore into 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 principal 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.

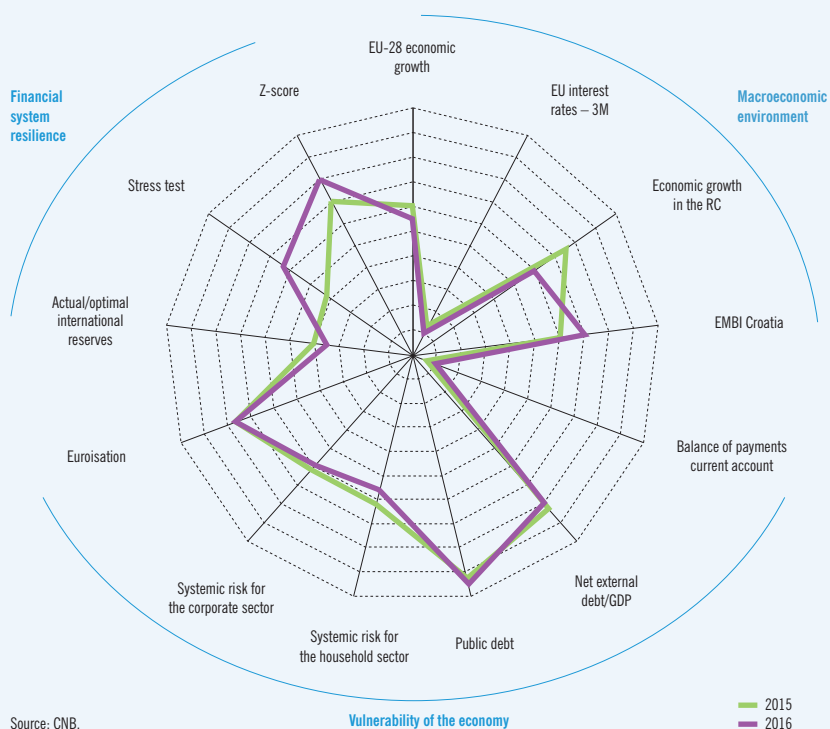
The purpose of this publication is systematically to inform financial market participants, other institutions and the general public about the vulnerabilities and risks threatening financial system stability in order to facilitate their identification and understanding as well as to prompt all participants to undertake activities providing appropriate protection from the consequences should these risks actually occur. It also aims at enhancing the transparency of CNB actions to address the main vulnerabilities and risks and strengthen the financial system's 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

Financial stability map



Source: CNB.

Despite improved economic figures and expectations as well relatively more favourable international developments, risks to financial stability have remained high due to the considerable structural imbalances. The domestic banking system is still capable of withstanding, although with a slightly worse performance, highly unlikely but plausible shocks simulated by stress testing.

The main financial stability indicators for Croatia are summarised in the financial stability map, which shows changes in key indicators of the possibility of the occurrence of risks related to the domestic and international macroeconomic environment and the vulnerability of the domestic economy, as well as changes in the indicators of financial system resilience that

can eliminate or reduce costs should such risks materialise. The map shows the most recent market developments or forecasts of selected indicators and their values in the reference period, i.e. the previous year. An increased distance from the centre of the map for each variable indicates a rise in the risk or vulnerability of the system, that is, of a decrease in its resilience

and, accordingly, a greater threat to stability. Any increase in the area of the map, then, indicates that the risks for the system's financial stability are increasing, while a diminution of the area suggests they are decreasing.

While the economic outlook has improved from that presented in the last issue of Financial Stability, the risks to financial stability have not decreased. The GDP growth projection for 2015 has been revised upwards to 1.7% (from 0.5% projected in early 2015) and that for 2016 to 1.8%. The expected 2015 current account balance has been revised upwards to 4.8% of GDP (partly due to the effect of losses incurred by the banks from the conversion of Swiss franc-indexed loans, amounting to an approximate 2% of GDP), while the 2016 balance is projected at 2.7% of GDP.

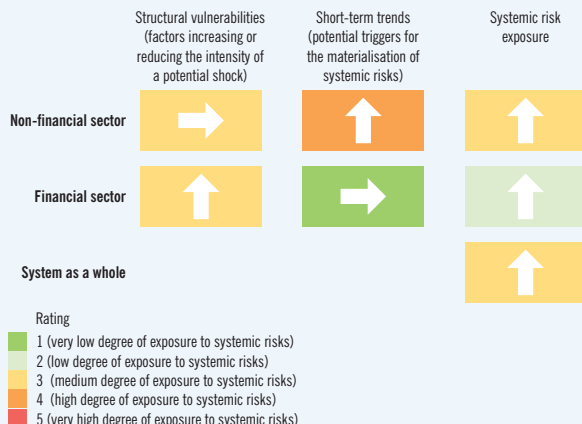
Fiscal sustainability indicators have improved on the back of the economic growth and slow economic recovery. However, the still existing structural weaknesses pose high risks to financial stability. This primarily refers to a relatively high and growing public debt and then to a substantial external debt, which makes the domestic economy sensitive to sudden shifts in interest rates, caused by either a possible higher increase in benchmark interest rates or a rising sovereign risk premium.

Liquidity in European financial markets has remained abundant and interest rates have stayed low, although the announced quantitative easing levels were somewhat below market expectations. At its meeting in December, the Fed started to gradually increase benchmark interest rates for the US economy. It is expected that interest rates will be increased further if the economy continues to recover. However, in contrast with positive economic indicators in the EU and US, a slowdown in the growth rates of the Chinese economy and other emerging market economies has to some extent given cause for concern.

In Croatia, the several-year household deleveraging process has continued, accelerated by the conversion of Swiss franc loans that has led to reductions in the loan principal. This sector's aggregate vulnerability has decreased not only because of the decline in its debt but also because of increases in deposits and other liquid assets, as well of disposable income growth generated by changes in tax regulations. The deleveraging trend is expected to cease when consumer optimism increases on a permanent basis amid employment growth and ongoing economic recovery.

The vulnerability of the non-financial corporate sector has declined, primarily due to good business performance in 2014 and to some extent also to expectations of favourable results in 2015. Like the household sector, non-financial corporations have continued to deleverage from relatively high levels, although the trend is primarily related to the reduction of public enterprise debt. As shown by an analysis carried out in this is-

Figure 1 Risk map



Note: The risk map summarises the level and dynamics of structural and cyclical vulnerabilities in the financial and non-financial sectors and it is based on the standardisation of indicators that reflect systemic risks in these sectors. For more detail on this topic see Box 1 Redesigning the systemic risk map, *Financial Stability*, No. 15, July 2015.

Source: CNB.

Structural vulnerabilities of the non-financial sector have remained substantial despite the economic recovery, primarily due to high public debt and external debt to GDP ratios and also because of risks related to the potential growth of financing costs after an increase in the sovereign risk premium.

According to the results of stress testing pointing to a growth in sensitivity of the banking sector the vulnerability of the financial sector increased from the previous period. However, stable and very mild financial market conditions that are expected to remain such in the forthcoming period reduce the probability of crisis events with systemic consequences.

sue of Financial Stability (in the chapter Non-financial corporate sector), the high level of corporate debt in Croatia compared with that of other new EU member states can to some extent be accounted for by a larger share of tangible assets in corporate balance sheets. The corporations whose assets are financed or burdened by credit liabilities are less capable of adjusting on the aggregate level.

The results of integrated stress tests clearly show that banks have not managed to reduce risks by shifting from lending to the private sector to lending to the government sector, but have only changed the source and postponed the materialisation of these risks. However, even after seven years of crisis, the domestic banking system is still capable of withstanding shocks threatening the continuity of operations of individual credit institutions, although it showed a slightly weaker performance than in the previous stress tests. The weaker performance is a consequence of a drop in capitalisation caused by the conversion of Swiss franc loans and of the somewhat stronger shocks envisaged under the stress scenario.

# Macroeconomic environment

The continued favourable conditions in international financial markets are reducing the risks to Croatia's financial stability. However, a relatively slow economic recovery, coupled with the fast growth and high level of public debt, the large exposure of domestic sectors to changes in interest rates and the exchange rate and the resulting high sovereign risk premium are the main vulnerabilities of the domestic financial system.

The global economic recovery continued in the second half of the year and conditions in international financial markets remained relatively quiet, despite an increase in volatility caused by investor concerns about the sustainability of the Chinese economic growth and negative macroeconomic developments in large emerging markets. The economic recovery in the EU continues, driven by decreases in energy and commodity prices, the continuation of the ECB's expansionary monetary policy and the weakening of the effective euro exchange rate, with strengthened domestic demand expected to go on contributing the most to recovery in the forthcoming period. Developed countries' economic growth rates projected for 2016 are still relatively low compared to those of CEE countries, which average 3%. The expected 2016 growth rate for Croatia, which exited a six-year recession in 2015, is slightly lower than the rates of most of peer countries (Table 1). A possible slowdown in the recovery of EU countries would pose a risk to the continued momentum of the foreign demand-based recovery in the domestic economy.

Under such conditions, the ECB has continued to pursue its expansionary monetary policy, standing ready to continue applying non-conventional monetary measures for as long as it deems necessary. ECB interest rates have remained very low

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

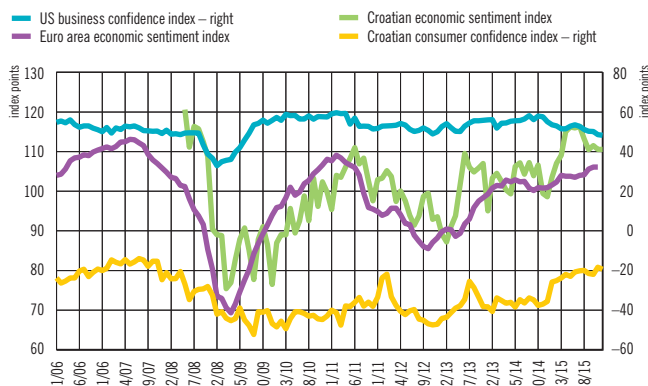
	Annual GDP growth rate			Quarterly GDP growth rate, $\Delta Q/Q_{t-1}$		Annual rate of change in exports		Annual rate of change in industrial production (seasonally adjusted)	
	2014	2015 <sup>a</sup>	2016 <sup>b</sup>	Q2/2015	Q3/2015	Q1/2015	Q2/2015	Q2/2015	Q3/2015
USA	2.4	2.6	2.8	1.0	0.5	-6.0	-8.0	1.5	1.1
EU	1.4	1.9	2.0	0.5	0.4	6.9	3.1	1.6	1.8
Germany	1.6	1.7	1.9	0.4	0.3	8.5	5.8	1.7	1.4
Italy	-0.4	0.9	1.5	0.3	0.2	5.8	2.4	0.7	1.8
Slovenia	3	2.6	1.9	0.7	0.4	6.0	3.2	4.9	4.8
Slovak R.	2.5	3.2	2.9	n.a.	n.a.	4.7	6.1	3.9	5.4
Czech R.	2	4.3	2.2	1.0	0.5	6.7	6.4	5.0	5.6
Poland	3.3	3.5	3.5	0.8	0.9	8.9	5.1	4.4	3.9
Hungary	3.7	2.9	2.2	0.5	0.6	10.3	6.7	6.0	5.8
Estonia	2.9	1.9	2.6	0.6	-0.4	-3.6	-6.6	-1.7	-4.4
Latvia	2.8	2.4	3.0	1.3	1.0	2.9	0.9	5.2	3.8
Lithuania	3	1.7	2.9	0.4	0.4	-2.2	-8.1	4.7	3.6
Bulgaria	1.5	1.7	1.5	0.6	0.7	9.5	n.a.	4.0	2.9
Romania	2.8	3.5	4.1	0.0	1.4	8.6	3.4	3.1	3.4
Croatia <sup>b</sup>	-0.4	1.7	1.8	1.0	1.3	14.7	7.7	2.5	4.1

<sup>a</sup> Estimate. <sup>b</sup> Forecast. <sup>c</sup> The seasonal adjustment methodology of Croatia's GDP has been presented in the manuscript titled Description of the X-12 seasonal adjustment methodology that is available at request.  
Sources: Eurostat, CBS, Bloomberg, OECD and CNB (for Croatia).

– the repo rate stands at 0.05% and the deposit facility interest rate is negative at -0.20% (Figure 3). In September the ECB raised the issue share limit for quantitative easing from 25% to 33% to facilitate the implementation of the purchase programme, related to the assessment that the risks of lower inflation in the forthcoming period are greater than had been previously expected. In addition, the announcement that the

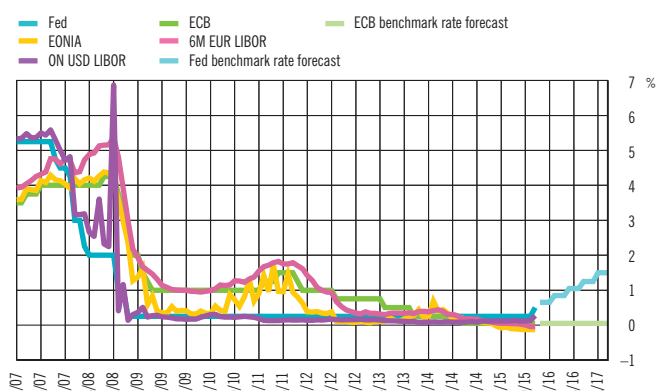
expanded bond purchase programme, involving government bonds of euro area countries and bonds of European institutions and agencies in the secondary market in a cumulative amount of EUR 60bn per month, is intended to run even after September 2016, or until the euro area inflation rate converges on the medium-term target of “slightly below 2% annually”, has added to expectations of low euro area interest rates.

Figure 2 Economic sentiment and business confidence indices



Sources: Bloomberg, EC and CNB.

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



Sources: Fed, ECB and Bloomberg.

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

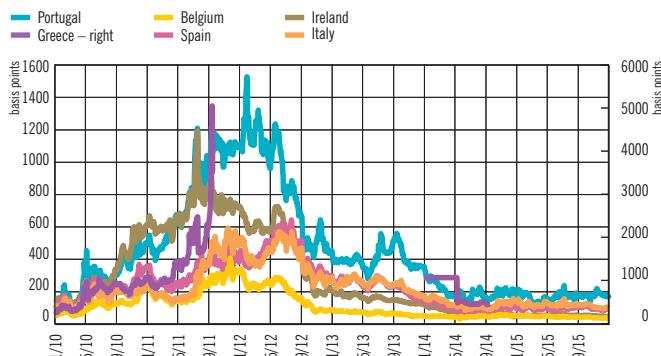
	Fiscal balance, as % of GDP (ESA 2010)			Current account balance, as % of GDP		
	2014	2015 <sup>a</sup>	2016 <sup>b</sup>	2014	2015 <sup>a</sup>	2016 <sup>b</sup>
USA	-4.9	-4.0	-3.5	-2.3	-2.3	-2.4
EU	-3.0	-2.5	-2.0	1.6	2.2	2.2
Germany	0.3	0.9	0.5	7.8	8.7	8.6
Italy	-3.0	-2.6	-2.3	2.0	2.2	1.9
Portugal	-7.2	-3.0	-2.9	0.3	0.5	0.5
Ireland	-3.9	-2.2	-1.5	3.6	5.9	5.7
Greece	-3.6	-4.6	-3.6	-2.9	-1.0	-0.3
Spain	-5.9	-4.7	-3.6	1.0	1.4	1.3
Slovenia	-5.0	-2.9	-2.4	6.5	7.0	7.5
Slovak R.	-2.8	-2.7	-2.4	-0.8	0.0	-1.2
Czech R.	-1.9	-1.9	-1.3	-2.0	-2.5	-2.4
Poland	-3.3	-2.8	-2.8	-1.1	-0.5	-0.9
Hungary	-2.5	-2.3	-2.1	2.2	4.3	5.5
Estonia	0.7	0.2	0.2	1.3	1.6	1.2
Latvia	-1.5	-1.5	-1.2	-2.0	-1.8	-1.9
Lithuania	-0.7	-1.1	-1.3	3.9	-0.8	0.2
Bulgaria	-5.8	-2.8	-2.7	0.7	1.4	1.3
Romania	-1.4	-1.2	-2.8	-0.4	-0.8	-1.9
Croatia	-5.6	-5.0	-4.4	0.8	4.8	2.7

<sup>a</sup> Estimate. <sup>b</sup> Forecast.

Sources: European Commission, *European Economic Forecast*, fall 2015 and CNB (for Croatia).

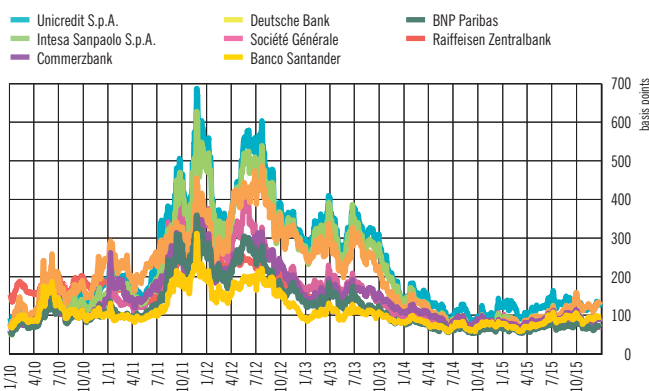
ECB measures have resulted in the further improvement of financial conditions in terms of the accessibility, price and maturity of financing and in the alleviation of deflationary pressures. Government bond yields have continued to narrow, fluctuating occasionally, and for some countries have even acquired negative values; according to an ECB survey, financing conditions have improved for enterprises of all sizes (Figures 4, 5 and 6). The issue of the sustainability of private and public sector debts, despite their high levels, has been less prominent against a background of relatively stable financial markets, a slow pace of deleveraging and an insufficiently fast implementation of reforms in some countries. However, notwithstanding the improvement in financing conditions and macroeconomic developments, lending activity in the euro area is still weak so that bank profitability is expected to remain relatively low. Furthermore, intensified efforts are still required to solve the problem of non-performing loans, the high levels of which weigh on banks' operations and slow down lending recovery. Although potential threats related to the operation of "shadow banks" are not considered serious at the EU level, these risks are increasing due to this sector's accelerated expansion (for more details

Figure 4 CDS<sup>a</sup> spreads for 5-year bonds of selected euro area countries



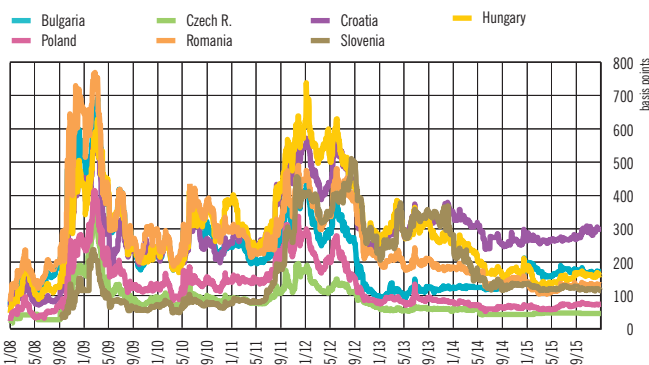
<sup>a</sup> Credit default swaps (CDS) spread is an annual premium that a CDS buyer pays for protection against credit risk associated with an issuer of an instrument. Source: Bloomberg.

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



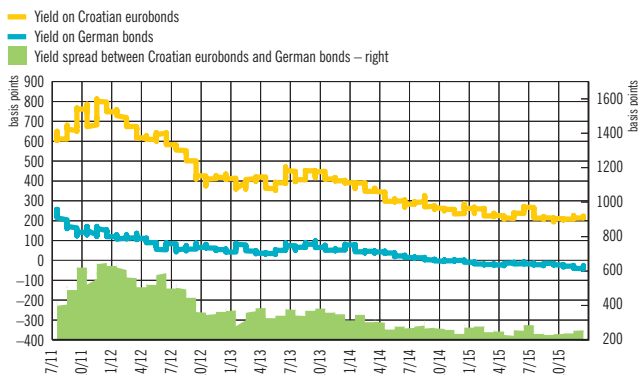
Source: Bloomberg.

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



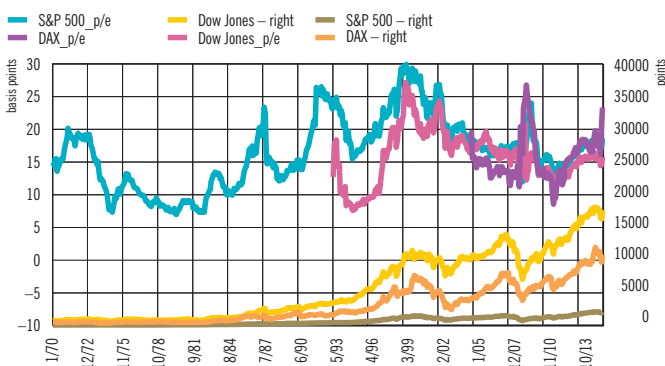
Source: Bloomberg.

Figure 7 Yields on Croatian and benchmark German bonds maturing in 2018 and their spread



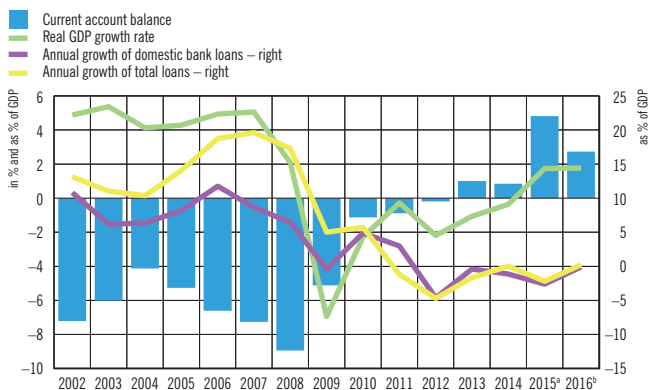
Sources: Bloomberg and CNB calculations.

Figure 8 Price to earnings ratio of leading global stock exchange indices



Note: P/e measures the share price relative to per-share earnings.  
Source: Bloomberg.

Figure 9 Foreign capital inflows and GDP growth in Croatia



<sup>a</sup> Estimate. <sup>b</sup> Forecast.  
Sources: CBS and CNB.

Table 3 Public and external debt in selected European emerging market countries as % of GDP

	Public debt			External debt		
	2014	2015 <sup>a</sup>	2016 <sup>b</sup>	2013	2014	6/2015
Italy	132.3	133.0	132.2	119.0	124.9	130.5
Portugal	130.2	128.2	124.7	228.0	235.2	232.7
Ireland	107.5	99.8	95.4	938.1	852.8	864.7
Greece	178.6	194.8	199.7	229.1	236.7	251.8
Spain	99.3	100.8	101.3	155.0	166.0	170.6
Slovenia	80.8	84.2	80.9	111.5	124.0	119.8
Slovak R.	53.5	52.7	52.6	81.3	90.0	88.9
Czech R.	42.7	41.0	41.0	63.5	66.5	67.7
Poland	50.4	51.4	52.4	70.1	70.6	73.0
Hungary	76.2	75.8	74.5	146.3	145.0	149.7
Estonia	10.4	10	9.6	93.7	94.6	100.5
Latvia	40.6	38.3	41.1	131.4	142.1	145.5
Lithuania	40.7	42.9	40.8	69.9	70.5	78.3
Bulgaria	27	31.8	32.8	91.8	93.6	84.5
Romania	39.9	39.4	40.9	68.1	63.0	59.4
Croatia	85.1	86.3	89.5	105.4	108.4	112.8

<sup>a</sup> Estimate. <sup>b</sup> Forecast.

Sources: European Commission, *European Economic Forecast*, fall 2015, World Bank, *Quarterly External Debt Statistics* and CNB (for Croatia).

on shadow banking in Croatia see Box 2 Shadow banking in Croatia).

In response to the recovery of the US economy, the Fed increased the benchmark interest rate late in the year (Figure 3). The Fed's tightened monetary policy and its divergence from monetary policies of other major central banks could result in the tightening of global financial conditions, especially in emerging market countries, due to expectations of a fall in their net capital inflows and the withdrawal of some investors from these countries (Figure 8).

On the other hand, relaxed and relatively stable financial conditions prevailing in 2014/2015 have been conducive to excessive risk appetite on the part of market participants and risks of a sudden change in currently very low risk premiums have increased. In many developed countries financial asset prices have recorded a relatively strong growth, reflected in a fall in bond yields and an increase in equity indices, not necessarily accounted for by macroeconomic and financial indicators (Figures 4, 5, 6, 7 and 8).

The mentioned increases in macroeconomic and financial risks have been accompanied by a growing number of geopolitical risk areas, which also adds to the probability of shocks that could threaten financial market stability. Potential crisis

triggers include developments in China, uncertainties surrounding trends in Ukraine, in the Middle East and in some African countries, all of which could adversely affect movements of goods and capital. The refugee crisis in Europe could also create problems in cross-border transactions in the medium term and negatively impact goods exports and tourism services exports. Risks associated with Greece have been considerably reduced after the signing of the European Stability Programme, but there is still a risk of potential difficulties in the implementation of the Programme. The main commodity exporters, emerging market countries, including Russia and Brazil, have been especially strongly affected by a drop in commodity prices, which has caused depreciation pressures in these countries.

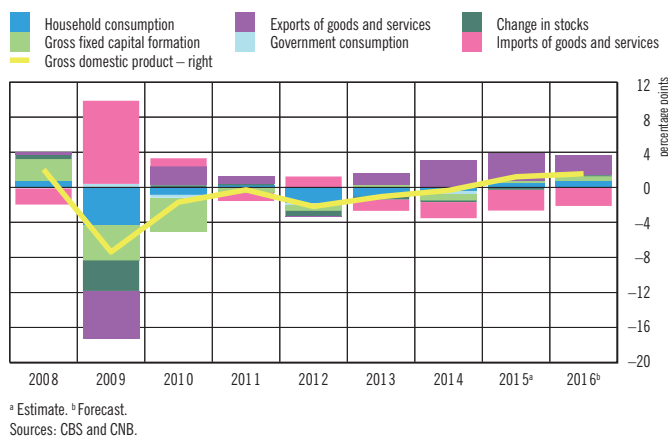
Under a scenario of a surge in risk premiums, countries with high financing and refinancing needs and those with significant macroeconomic vulnerabilities, including Croatia, would be threatened the most.

Despite a higher than expected real GDP growth rate, Croatia's recovery is slower than that in most of its CEE peers. The real rate of GDP growth could approximate 1.7% in 2015 and 1.8% in 2016. The main positive contribution to economic activity in 2015 came from the export sector, which is also expected to boost economic growth in 2016. An increase in disposable income due to income tax changes, coupled with employment growth, boosted the wage bill in 2015, so that consumption is expected to provide a positive contribution to GDP in 2016, as is the expected private investment growth, stimulated partly by an improved use of EU funds. Government consumption could stagnate (Figure 10).

External debt, although stagnating in absolute terms, has continued to have a large share in GDP, which exposes Croatia to large financing-related risks. Having reached 105% of GDP in late 2015, external debt could stand at about 103% of GDP at the end of 2016. This indicator's slight decrease has partly resulted from a rise in nominal GDP and continued deleveraging by credit institutions, although corporate and government external debt has been on the increase. These trends are expected to continue in 2016 (Figure 12). Due to lower needs for the refinancing of maturing debt in 2016 than in the previous year and an expected surplus in the current account<sup>1</sup>, external vulnerability indicators have continued to improve (Figure 15) and risks related to external debt financing have diminished because a large portion of the debt is accounted for by domestic banks' parent banks and affiliated enterprises (Figure 13). Furthermore, a model estimate of the optimal international reserve level shows that the current reserve level is sufficient to cushion any potential shock and preserve the stability of the kuna/euro

1 The increase of the current account surplus relative to the previous year, which is expected to amount 4.8% of GDP in 2015, was due not only to favourable trends in total international trade in goods and services, but also to bank losses generated by the conversion of Swiss franc loans recorded in the third quarter of 2015, estimated at about 2% of GDP. For more details, see *CNB Bulletin*, No. 220.

Figure 10 GDP growth pattern (contribution to growth)



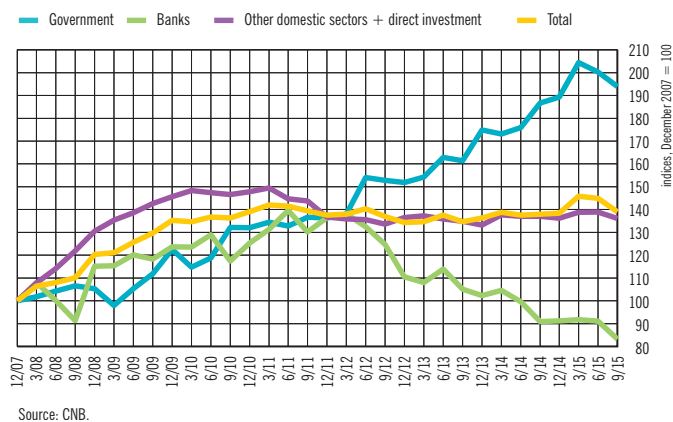
<sup>a</sup> Estimate, <sup>b</sup> Forecast.  
Sources: CBS and CNB.

Figure 11 Savings and investment – total and by sector



<sup>a</sup> Estimate, <sup>b</sup> Forecast.  
Sources: MoF and CNB (estimate).

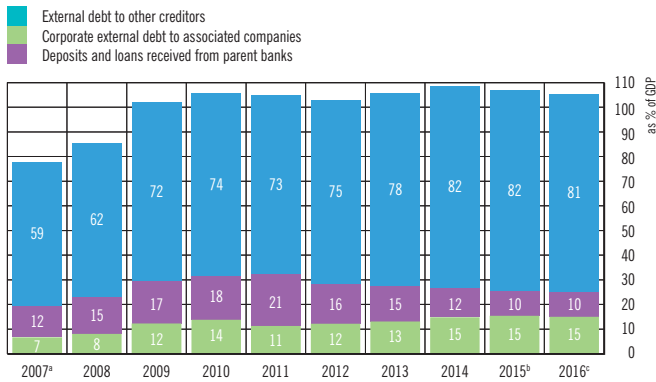
Figure 12 External debt by domestic institutional sector



Source: CNB.

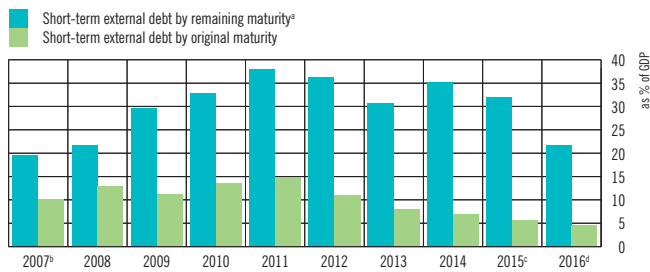


Figure 13 Total external debt by creditor



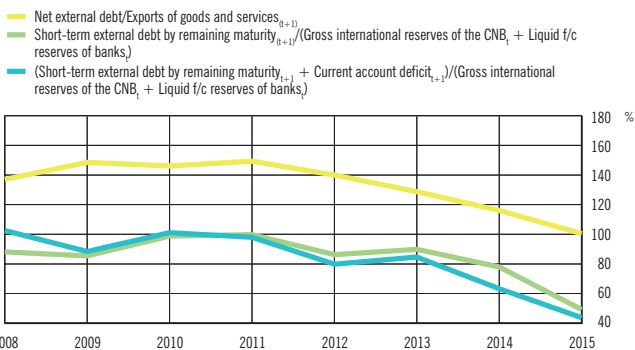
<sup>a</sup> Since end-2007, external debt has been calculated according to the new methodology. <sup>b</sup> Estimate. <sup>c</sup> Forecast. Source: CNB.

Figure 14 Short-term external debt



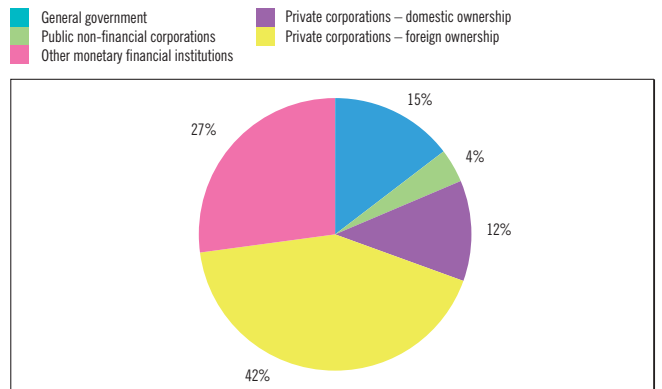
<sup>a</sup> Short-term external debt by remaining maturity is the amount of debt maturing in the reference year, representing the sum of the balance of short-term debt at the end of the previous year and long-term debt maturing in the reference year. <sup>b</sup> Since end-2007, external debt has been calculated according to the new methodology. <sup>c</sup> Estimate. <sup>d</sup> 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. Source: CNB.

Figure 15 Selected indicators of external vulnerability



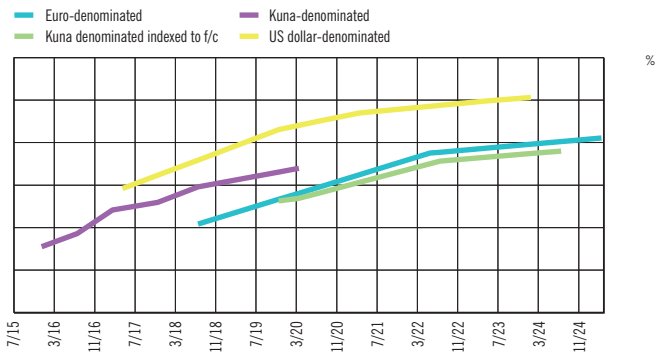
Note: Net external debt is calculated as gross external debt net of foreign debt claims. Source: CNB.

Figure 16 Projection of external debt principal payments in 2016 by sectors



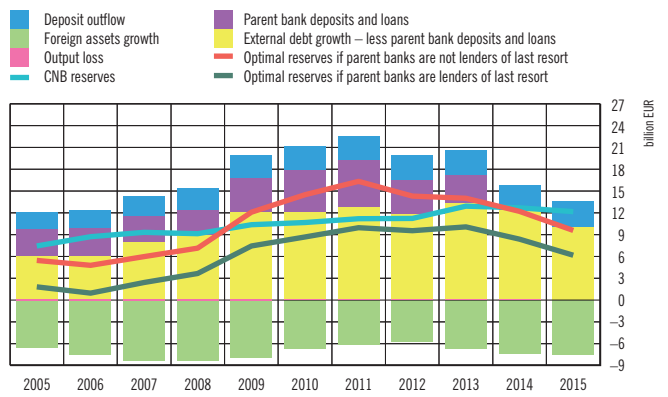
Source: CNB.

Figure 17 Yield curves of Croatian bonds issued on the domestic and foreign markets by currency



Note: Yield curves are the result of the interpolation of the data on bond yields by the currency of the issue. Sources: Bloomberg and CNB calculations.

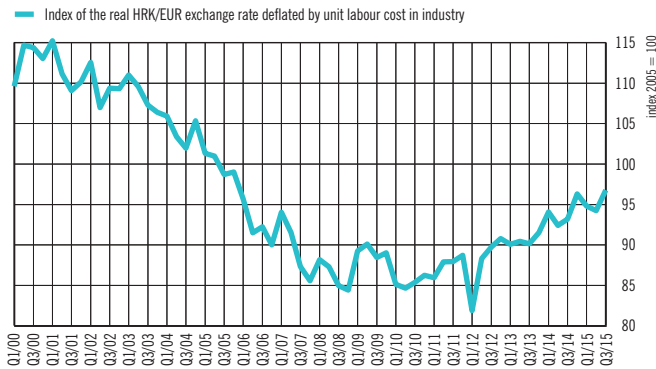
Figure 18 Optimal international reserves – contribution of individual components



Source: CNB.

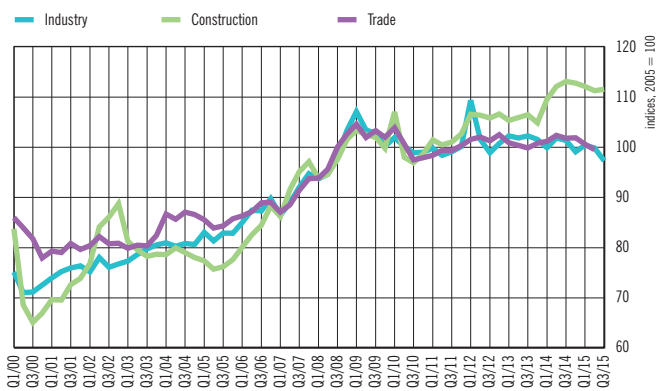


Figure 19 Real kuna/euro exchange rate



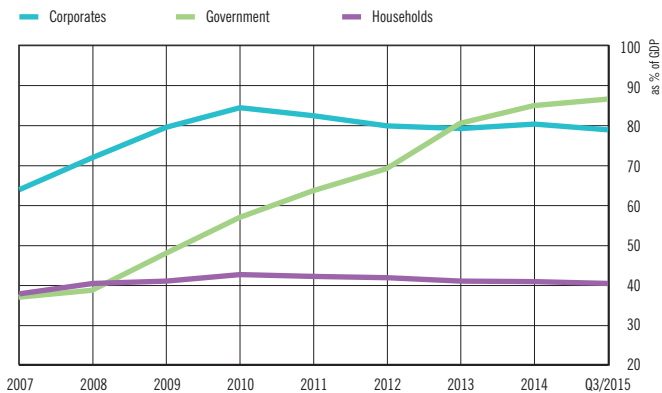
Note: A fall in the index indicates a real appreciation of the kuna against the euro.  
Sources: CBS, CNB and CNB calculations.

Figure 20 Unit labour cost



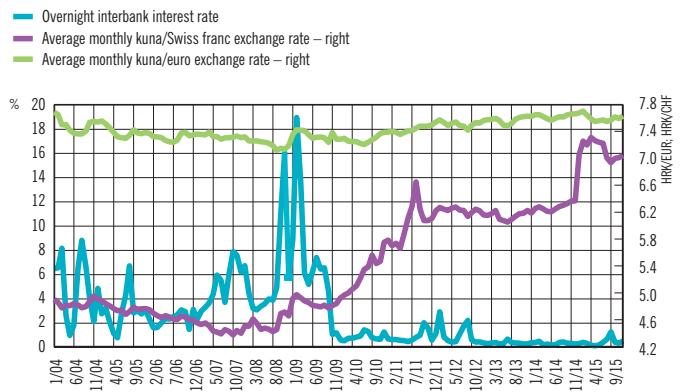
Sources: CBS and CNB calculations.

Figure 21 Total debt by sector



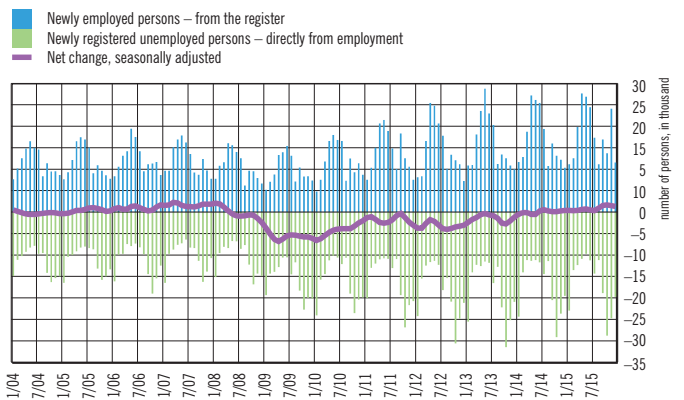
Source: CNB – financial accounts.

Figure 22 Kuna/euro and kuna/Swiss franc exchange rates and overnight interest rates



Source: CNB.

Figure 23 Changes in employment registered with the Croatian Employment Service (CES)



Sources: CES and CNB calculations.

exchange rate, which is a key precondition for the maintenance of the country's financial system (Figures 18 and 22).

A relatively mild fiscal consolidation has not reduced risks to the domestic economy due to the high growth rates and the high levels of public debt, which is expected to reach 90% of GDP in 2016 (Tables 2 and 3). Croatia's risk premium has remained considerably higher than its CEE peers' premiums, with the spread trending further upwards. Specifically, the spread between CDS on a five year bond for Croatia and comparable CDS for CEE countries widened from 153 b.p. at the end of June 2015 to 182 b.p. at the end of December 2015 (Figure 5). Such trends directly increase the costs of borrowing for the government, and indirectly for the private sector, both in domestic and foreign capital markets (Figures 6, 7 and 17). The materialisation of shocks and the resulting tightening of international financial market conditions could result in a deterioration of public debt sustainability indicators and restrict, and increase the price of, access to both domestic and foreign

capital for the private sector, which could make debt servicing more difficult and have an adverse impact on the banking system stability.

Due to high capitalisation, the banking system has remained stable, despite the considerable material effects that the resolution of the issue of debtors with Swiss franc loans has had on bank performance indicators. Non-performing placements have remained high, but risks to the banking system stability stemming from that source are not significant due to adequate capitalisation and provisions for non-performing placements.

Household and corporate loans continued to drop in 2015, but private sector deleveraging is expected to stop in 2016. De-

spite the continued CNB expansionary monetary policy aimed at maintaining high liquidity in the banking system, lending activity is still weak, primarily due to a drop in corporate demand, resulting from weak corporate balance sheets, and a decrease in household demand, caused by unfavourable labour market indicators that have only recently started a mild recovery (Figures 9 and 23).

The main vulnerabilities of the domestic economy arise from a relatively slow economic recovery, public debt growth, uncertainties surrounding the pace of fiscal consolidation and domestic sectors' sensitivity to changes in financing conditions based on high (re)financing needs and exposure to currency and interest rate risks.

## Box 1 An overview of macroprudential policies in EU member states and in Norway

Financial crises occur relatively frequently and lead to considerable negative effects. In addition to creating fiscal costs<sup>1</sup> and boosting public debt, they usually generate substantial output losses<sup>2</sup> and have other economic and social consequences. The cumulative output loss in 147 banking crises in various countries over the 1970–2011 period, compared to the trend in the pre-crisis period, was 23% of GDP, direct fiscal costs amounted to 6.8% of GDP and public debt increased on average by 12.1% of GDP (Laeven and Valencia<sup>3</sup>).

The recent banking crises rank among the costliest in terms of fiscal costs and output losses, and the last wave of the global financial crisis has affected advanced economies to a much greater extent than previous crises (Laeven and Valencia). The latest global financial crisis of 2008 has clearly shown that maintaining price stability (by monetary policy) and safeguarding financial institutions (by microprudential policy) may not be sufficient to preserve the stability of the financial system as a whole and that there is a gap between macroeconomic and microprudential policy.

The prudential regulatory framework had to be repositioned to be more focused on the financial system as a whole, that is, on systemic risk, as well as to provide for harmonised responses from macroprudential policy makers leading to the consistent implementation of macroprudential policy in EU and EEA member states. The European Systemic Risk Board (ESRB)<sup>4</sup> was therefore established on 16 December 2010 as part of the European System of Financial Supervision (ESFS), with a mandate for the macroprudential oversight of the EU financial system, and the new CRD IV/CRR legal framework<sup>5</sup> came into force on 1 January 2014, prescribing a new set of macroprudential instruments and uniform rules for their application to enable competent or designated authorities in EU and EGP member states to respond more efficiently to observed vulnerabilities and the accumulation of systemic risk. While allowing the member states to retain the leading role in macroprudential supervision, the new rules envisage guidelines, opinions and recommendations to be issued by the ESRB on the individual macroprudential measures reported by competent national authorities.

1 Direct outlays for the bailout of financial institutions.

2 In relation to the pre-crisis period.

3 Laeven, L., and F. Valencia (2012): *Systemic Banking Crises Database: An Update*, IMF, Working Paper, No. 12/163, Washington (D.C.).

4 Regulation (EU) No 1092/2010 of the European Parliament and of the Council of 24 November 2010 on European Union macro-prudential oversight of the financial system and establishing a European Systemic Risk Board.

5 Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 (OJ L 176) and Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC.

### Measures of macroprudential interest

In contrast with microprudential policy, which aims to improve the safety of individual financial institutions, macroprudential policy focuses on the safeguarding of the stability of the financial system as a whole. The use of some instruments for microprudential purposes and for the purposes of other economic policies<sup>6</sup> has an indirect effect on systemic risk and financial stability. This discussion therefore addresses all measures, irrespective of their primary aims, that are reported or notified to the ESRB<sup>7</sup> – measures of macroprudential interest.

In general, measures of macroprudential interest were used intensively in EU member states and in Norway<sup>8</sup> in the observed period (since the CRD IV/CRR legal framework came into effect on 1 January 2014), with 188 such measures issued by 19 October 2015. Even if the measures adopted solely due to administrative or procedural reasons are excluded (ESRB, June 2015<sup>9</sup>), as well as those to be applied after 31 December 2016, the total number of measures of macroprudential interest is still 129 (Table 1).

However, the number and type of measures issued differ significantly across states (Figure 1). While some states intensively use almost all available instruments, others only apply buffers for global systemically

Table 1 Number of measures of macroprudential interest in EU member states and Norway on 19 October 2015

Measure status	Number of measures		
	Norway	EU	Total
Active	12 (14)	92 (126)	104 (140)
Planned	2 (6)	23 (42)	25 (48)
Total	14 (20)	115 (168)	129 (188)

Note: The number of measures in brackets is the total number of measures of macroprudential interest, while other values exclude administrative and procedural measures (introducing CCB at a rate of 0%; retaining the same CCB rate from the previous quarter, exemption of small and medium-sized investment firms from the CCB or CB; recommendations of the macroprudential authority for the design of the national legal framework for the implementation of specific macroprudential instruments, etc.). Sources: ESRB and CNB calculations.

6 For more information on the relation between macroprudential policy and other economic policies see: *A Brief Introduction to the World of Macroprudential Policy* by Mirna Dumičić, August 2015, S-18, CNB.

7 An overview of measures of macro-prudential interest reported or notified to the ESRB is published and regularly updated on the ESRB website: [http://www.esrb.europa.eu/mppa/cbmd/shared/2015-10-19\\_Overview\\_national\\_macroprudential\\_measures.xlsx?eb83eedf2df720dfe17f93ba55052d8e](http://www.esrb.europa.eu/mppa/cbmd/shared/2015-10-19_Overview_national_macroprudential_measures.xlsx?eb83eedf2df720dfe17f93ba55052d8e).

8 Since Norway participates in the work of the ESRB, the list of measures of macroprudential interest includes information on the measures applied in this country although it is not an EU member.

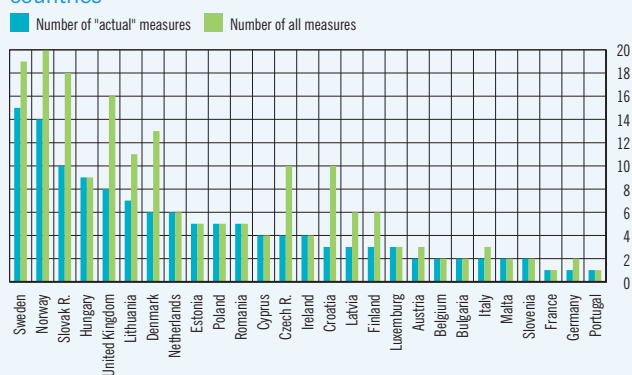
9 ESRB: *A review of macro-prudential policy in the EU one year after the introduction of the CRD/CRR*, ESRB, June 2015.

important institutions (G-SII buffer), which, in line with the gradual introduction<sup>10</sup> is to become compulsory for G-SIIs as of 1 January 2016.

#### An assessment of measures of macroprudential interest

The implemented measures of macroprudential interest are mostly aimed at preventing or mitigating systemic risks stemming from excessive credit growth and leverage<sup>11</sup>. The instruments mainly used for this purpose are the loan-to-value (LTV) ratio and capital conservation buffer (CB) (Table 2).

Figure 1 Number of measures implemented in individual countries



Note: Greece and Spain did not take any measures of macroprudential interest in the observed period. Sources: ESRB and CNB calculations.

The intensity of measures of macroprudential interest at the level of an individual state was assessed by examining the following components:

a) the amount of the combined buffer, consisting of the CB, the countercyclical capital buffer (CCB) and, extended by the following, as applicable: the structural systemic risk buffer (SSRB), the O-SII and the G-SII buffer,

b) the number of other measures of macroprudential interest implemented within the groups of instruments and intermediate objectives – LTV/LTI, risk weights (including LGD), DSTI/DSI, Pillar II and other instruments to reduce excessive credit growth and leverage as well as Pillar II, liquidity ratios and other instruments to achieve intermediate objectives to limit misaligned incentives and mitigate excessive maturity mismatch and market illiquidity.

The two components contribute equally to the overall assessment of intensity. The intensity of the measures implemented in an individual country is expressed in a relative relation to the largest observed intensity in the states under consideration (Table 3).

<sup>10</sup> CRD, Article 162, paragraph (5).

<sup>11</sup> Intermediate objectives of macroprudential policy contributing to the safeguarding of financial stability are defined in Recommendation ESRB/2013/1 (Recommendation of the European Systemic Risk Board of 4 April 2013 on intermediate objectives and instruments of macro-prudential policy).

Table 2 Share of measures and instruments to achieve intermediate objectives of macroprudential policy

Intermediate objectives/instruments	Percentage
<b>Reducing excessive credit growth and leverage</b>	<b>74%</b>
LTV or LTI	16%
CB	10%
Risk weights and LGD	9%
CCB	8%
DSTI or DTI	7%
Stress testing/sensitivity tests	5%
Loan maturity and amortisation	7%
Others	3%
SSRB	3%
G-SII buffer	2%
Pillar 2	2%
Leverage ratio	1%
LTD	1%
<b>Limitation of misaligned incentives</b>	<b>17%</b>
O-SII buffer	8%
SSRB	3%
Pillar 2	3%
G-SII buffer	2%
Other	1%
<b>Mitigation of excessive maturity mismatch and market illiquidity</b>	<b>8%</b>
Liquidity ratios	7%
Pillar 2	1%
<b>Reduction of exposure concentration</b>	<b>1%</b>
SSRB	1%

Note: Some instruments are not necessarily designed to achieve only one intermediate objective so that some of them are shown within different various intermediate objectives.

Sources: ESRB and CNB calculations.

#### An analysis of the intensity of measures of macroprudential interest in the context of the capitalisation of the banking system at the time of the implementation of a new legal framework<sup>12</sup> and the financial cycle

As implied by the previously mentioned new regulations, the responses of macroprudential policy makers should partly reflect the financial cycle, whose behaviour, and the consequent accumulation of systemic risk, is often country-specific. As a full description of the financial cycle requires much more complex indicators, the indicator of the financial cycle used for the purposes of this analysis is a relatively simple measure of the credit gap, defined as the difference between the credit-to-

<sup>12</sup> The capital adequacy ratio as at 31 December 2013.

Table 3 Estimated intensity of measures of macroprudential interest in EU member states and in Norway

EU/EEA member state	Mark	Estimated intensity	EU/EEA member state	Mark	Estimated intensity
Sweden	SE	1.00	Netherlands	NL	0.32
Norway	NO	0.91	United Kingdom	UK	0.29
Slovak R.	SK	0.76	Italy	IT	0.28
Czech R.	CZ	0.71	Portugal	PT	0.27
Estonia	EE	0.69	Cyprus	CY	0.27
Croatia	HR	0.63	Hungary	HU	0.27
Bulgaria	BG	0.60	Denmark	DK	0.26
Finland	FI	0.52	Ireland	IE	0.20
Lithuania	LT	0.47	Belgium	BE	0.13
Luxemburg	LU	0.41	Malta	MT	0.13
Latvia	LV	0.34	France	FR	0.03
Poland	PL	0.34	Germany	DE	0.01
Romania	RO	0.34	Greece	EL	0.00
Austria	AT	0.33	Slovenia	SI	0.00
			Spain	ES	0.00

Sources: ESRB and CNB calculations.

GDP ratio and its long-term trend. Although in most EU member states neither the average credit gap in the period from the beginning of the fourth quarter of 2013 to the end of the first quarter of 2015 nor the credit gap late in the first quarter of 2015 suggests an upward phase of the financial cycle, there are marked differences among the credit gaps of these states (Figure 2).

Most of the states are not in the upward phase of the financial cycle, that is, there is no need to set up the countercyclical buffer, so that the rate of the formal instrument for countercyclical action (CCB) different from zero was of all EU member states introduced only in Sweden<sup>13</sup>.

In addition to the position in the financial cycle, another factor to take into account is that the intensities of the implemented measures observed at the time when the new legal framework came into force (1 January 2014) were not balanced and that in some countries there were probably concerns that a sudden decrease in their intensity could have a destabilising effect on the financial system. Finally, countercyclical buffers that might be used in the downward phase in many countries were not set up in the earlier upward phase.

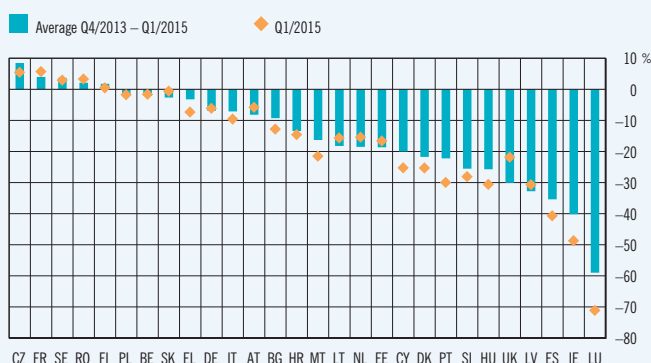
Among states that had similar credit gaps<sup>14</sup>, a certain correlation can be generally observed between the intensity of the implemented measures of macroprudential interest and the capitalisation at the time when the

13 It was also introduced in Norway; the rate in both countries was 1% and in mid-2016 it increases to 1.5%.

14 The categories of the countries with a credit gap smaller than -20%, from -20% to -5%, and higher than -5% were observed.

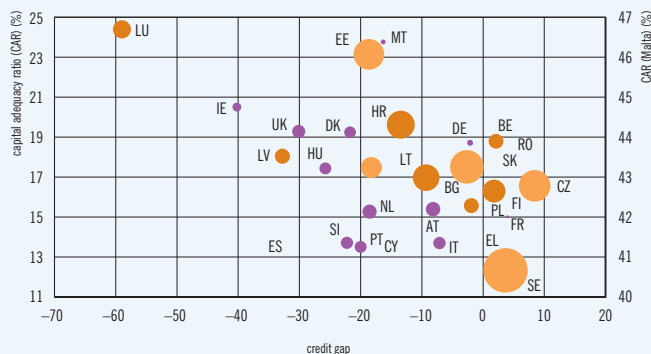
15 The Pearson coefficient, as a measure of linear correlation, is 0.65 for the states with a credit gap lower than -20%; 0.50 for the states with a credit gap of between -20% and -5%, excluding Malta; and 0.31 for the states with a credit gap exceeding -5%, excluding Sweden.

Figure 2 Credit gap in EU member states



Sources: ECB and CNB calculations for Croatia.

Figure 3 Intensity of measures of macroprudential interest relative to the initial capitalisation of the banking system and credit gap



Note: Intensity of measures taken by a specific state is represented by the size of "bubbles".  
Sources: ECB and CNB calculations.

new legal framework came into force<sup>15</sup>, with, as can be expected, the change in the intensity of the implemented measures in relation to the change in capitalisation being more significant for the group of states that are closer to the upward phase of the financial cycle (Figure 3).

Furthermore, the macroprudential measures implemented by the states that are closer to the upward phase of the financial cycle (measured by the credit gap) are on average slightly more intensive (Figure 3). The average intensity of the measures by the categories of the credit gap is approximately 0.23, 0.38 and 0.43. In addition, the intensity of measures within similar levels of the credit gap is more uneven among the states that are closer to the upward phase of the financial cycle. Some states with the credit gap exceeding -5% have not implemented any

measures of macro-prudential interest and some have implemented the most intensive measures.

### Conclusion

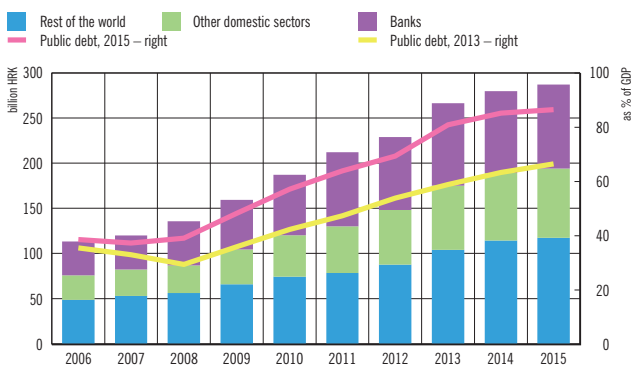
Since the coming into force of the new legal framework, measures of macroprudential interest have been used intensively in EU member states and in Norway. An analysis of the implementation of these measures in the context of the capitalisation of the banking system and the financial cycle suggests that the states in general, when introducing measures of macroprudential interest, took into account not only the financial cycle but also the level of capitalisation of the banking system in order to prevent a sudden release of capital capable of destabilising their financial systems. In this context, the intensity of the measures

implemented in Croatia corresponds with a higher level of capitalisation of the banking system. However, full harmonisation of the responses of macroprudential policy makers has not been achieved and some states aim to maintain the existing capital level with an increased intensity of responses.

Due to the relatively short period of implementation of macroprudential policies under the new legal framework, there is a need for further analyses that will – taking into account the uneven intensity and types of measures in the early stage of their implementation and possible differences in the level of adjustment of macroprudential policy with other economic policies – provide a more complete picture of the consistency of implementation of macroprudential measures.

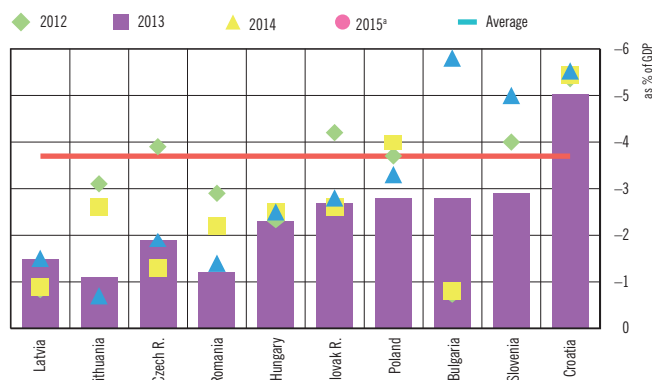
# Government sector

Figure 24 General government debt



Sources: CNB and EC (projection).

Figure 25 General government deficit



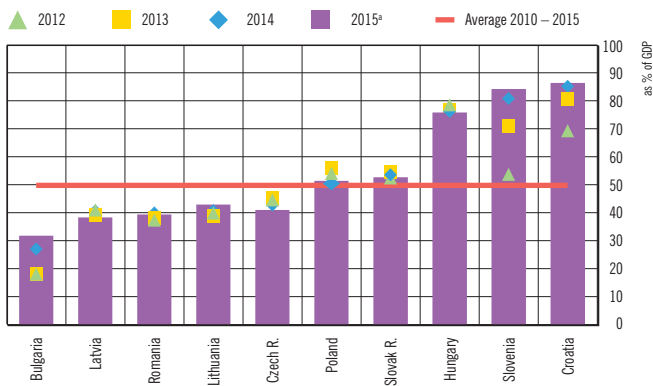
\* Estimate.  
Sources: EC and CNB.

The economic recovery in 2015 resulted in an improvement of indicators of fiscal sustainability risk from the previous period. The budget deficit reduction was caused by an increase in indirect revenues, whereas the overall impact tax changes had on revenue was mostly neutral. The growth of public debt has been decelerated by a decrease in the budget deficit and the use of pre-financing from 2014. However, in the group of peer countries, Croatia continues to have the highest deficit and public debt levels.

Despite the fact that expenditures were increased in the 2015 budget revision, the deficit will drop to the level envisaged by the Convergence Programme of the Republic of Croatia due to revenue growth stemming from heightened economic activity. The increase in budget revenues in 2015 will be primarily driven by the growth of indirect taxes caused by the economic recovery, tax changes and a base effect related to VAT revenues. As Croatia is under the Excessive Deficit Procedure, a substantial deficit reduction would definitely alleviate the pressure to fulfil the requirements in the following years. Although reduced, Croatia's deficit has remained the highest among those of peer countries (Figure 25).

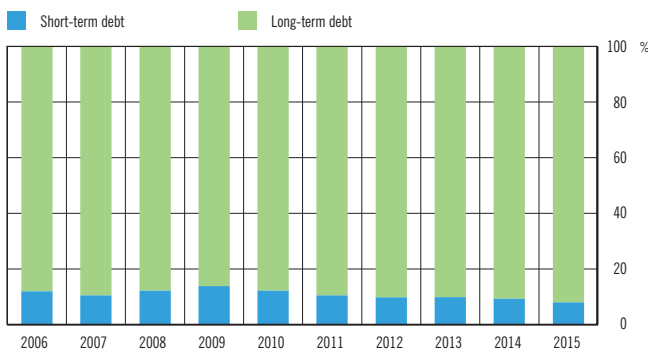
Tax changes implemented in 2014 and 2015 had a neutral effect on total revenues in the previous year. Tax bracket expansion and an increase in the personal exemption from income tax reduced the tax burden on a part of personal income. This offset the effects of increases in excises on tobacco and refined petroleum products, a rise in the rate of health insurance contributions, the expansion of the tax base by a new tax on interest and the tightening of criteria for the use of tax relief on reinvested earnings. Changes in the system of contributions for

Figure 26 Public debt



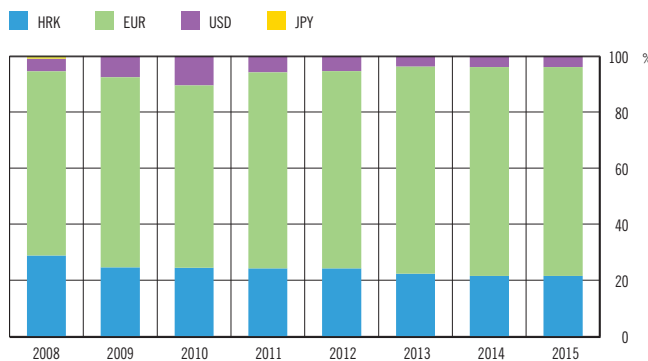
\* Estimate.  
Sources: EC and CNB.

Figure 27 Maturity breakdown of public debt



Source: CNB.

Figure 28 Currency breakdown of public debt



Source: CNB.

Table 4 Thresholds of the fiscal sustainability risk indicator<sup>a</sup>

Indicator	Direction to be safe	Threshold	Observation for Croatia	Change
$r - g^b$ (2015)	<	1.1 p.p.	4.1 p.p.	↓
General government public debt (as % of GDP) (2015)	<	42.8%	86.4%	↑
Cyclically adjusted primary balance (as % of potential GDP) (2015)	>	-0.5%	-0.6%	↑
Gross financing needs (as % of GDP) (2015)	<	20.6%	17.8%	↓
Share of short-term debt as a ratio of total debt (2015)	<	44.0%	8.1%	↓
Debt denominated in foreign currencies (2015)	<	40.3%	78.5%	↑
Weighted average maturity of public debt (years) (2015)	>	2.3	5.1	↑
Short-term external public debt (as % of international reserves) (2015)	<	61.8%	14.5%	↑

<sup>a</sup> Baldacci, E., I. Petrova, N. Belhocine, G. Dobrescu, and S. Mazraani: *Assessing Fiscal Stress*, IMF Working Paper, WP/11/100.

<sup>b</sup> Imputed interest rate on general government debt, deflated by the GDP deflator (5-year average), minus real GDP growth rate (5-year average).  
Sources: IMF WP/11/100 and CNB.

pension insurance based on the accelerated retirement plan had a positive impact on revenues. In contrast, the conversion of Swiss franc loans to euro loans could, according to ESA 2010 methodology, have a negative effect on profit tax revenues already in 2015.

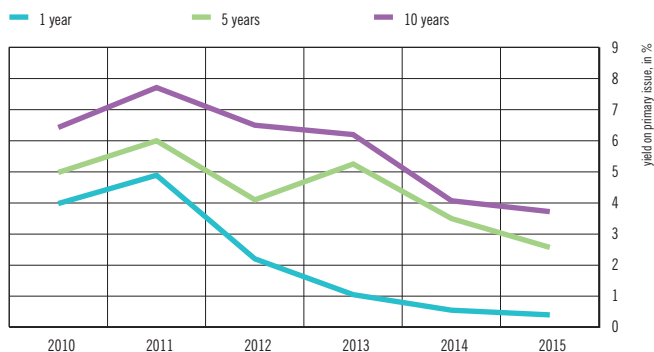
The budget deficit is expected to decrease in 2016 and 2017, primarily due to revenues increasing on the back of the economic recovery. However, maintaining financial stability requires that the pace of deficit reduction be accelerated and the extremely low interest rates utilised for debt refinancing under favourable conditions.

Public debt growth has continued to decelerate, but the debt level is still the highest among those of peer countries (Figure 26). Public debt growth decelerated in 2015, after a few years of very fast growth. Public debt is expected to grow by 1.4 percentage points in 2015, considerably less than in the previous years. This was due to an extensive use of pre-financing in late 2014 and a decrease in the budget deficit.

It is also noteworthy that the possibilities for extending the public sector coverage and in this way changing the public debt level have mostly been exhausted (Figure 24).

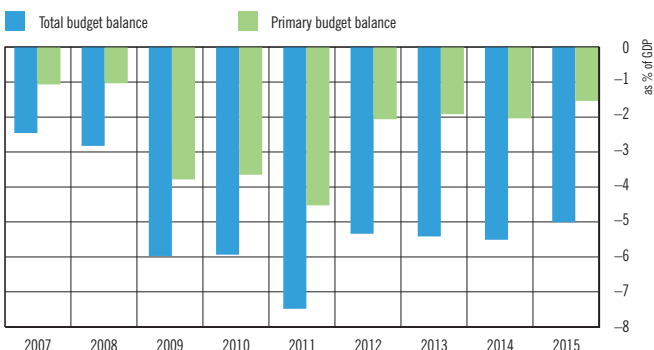


Figure 29 Yield on primary issue of euro and euro-indexed securities



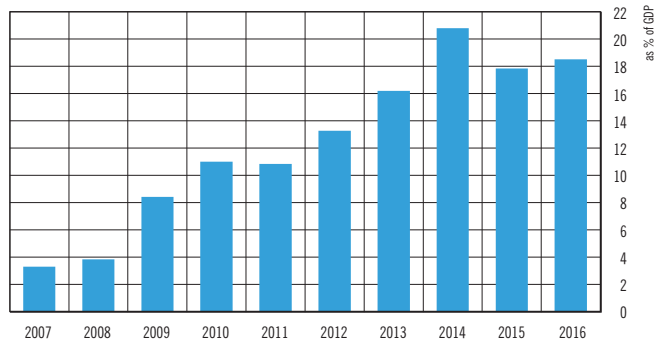
Source: Bloomberg.

Figure 30 General government deficit



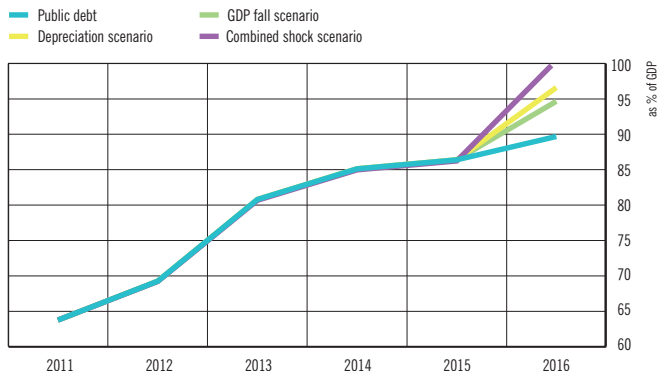
Sources: CNB and EC projections.

Figure 31 Financing needs



Note: Amounts are stated including T-bills.  
Source: CNB.

Figure 32 Projection of public debt under various scenarios



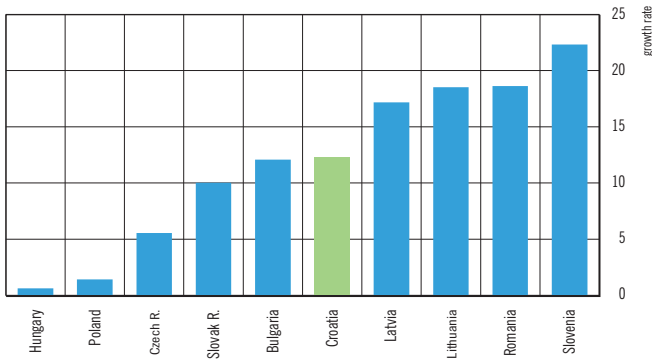
Sources: CNB and EC.

Fiscal sustainability risk indicators are still equally divided between the safe and risky areas, but it is a positive fact that the majority of indicators (six of them) have moved towards the safe area since the previous issue of Financial Stability. This is due to an improvement in economic indicators leading to a decrease in indicators “r – g” (Table 4). This primarily refers to real GDP growth in 2015, positive for the first time after six years. In addition, the cyclically adjusted primary balance decreased due to interest expenditure growth. The general government deficit indicator fell in 2015. The average public debt maturity lengthened from 4.8 to 5.1 years and is now more than twice as long as the benchmark maturity. The continued favourable maturity structure of public debt (Figure 27) has influenced another indicator – the short-term external debt to international reserves ratio – and, in turn, reduced the liquidity risk of public debt.

With current trends, high levels of public debt and foreign currency-denominated debt make it difficult to put public debt on a long-term sustainable path. Such a high level of public debt generates high interest expenditures, 3.6% of GDP, the highest level among peer economies (Figure 35). A considerable amount of public debt is denominated in foreign currency (78.5%), which makes it highly dependent on exchange rate and monetary policy stability.

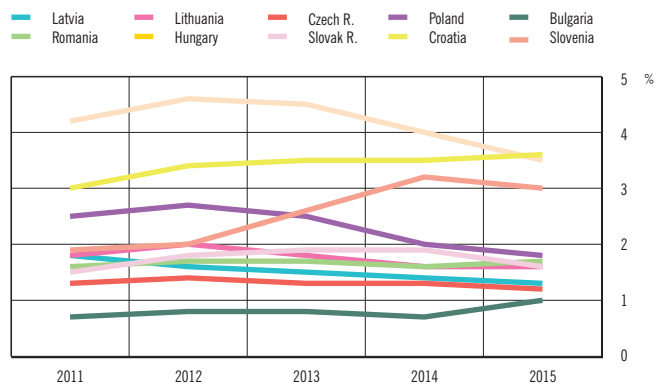
Financing needs are expected to increase in the following years. Specifically, although borrowing needs decreased in 2015, refinancing needs will grow as liabilities mature, despite a decrease in the budget deficit. This makes public finances vulnerable due to an increased risk of future interest rate changes and calls for a substantial fiscal consolidation aimed at reducing annual financing needs, which could otherwise reach as much as 20% of GDP.

Figure 33 Public debt growth rate (2009 – 2015)



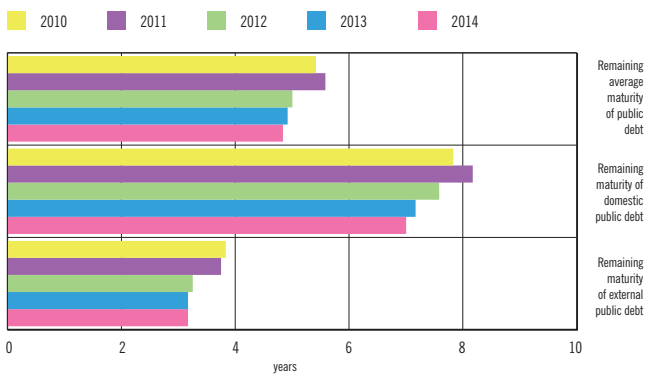
Source: EC.

Figure 35 General government interest expenses



Source: EC.

Figure 34 Average remaining maturity of general government debt



Source: CNB.

Yields on Croatia’s government securities narrowed to a minimum in 2015. Figure 29 shows a five-year long downward trend in yields on Croatian government bonds, which have, however, remained significantly higher than the yields of peer member states’ bond yields. Any possible increase in benchmark interest rates on the global market could be expected to push up yields on Croatian bonds and, consequently, increase interest expenditures.

As shown by public debt projections under stress scenarios, public debt is most sensitive to one-time depreciation. Under a stress scenario, a potential 10% depreciation in 2016 would increase public debt to 96.6% of GDP compared to 89.7% of GDP under a baseline scenario. Under a combined stress scenario involving a drop of 3.1% in GDP and a one-time depreciation of the kuna of 10%, public debt would increase to 101% of GDP. Under a stress scenario involving a decrease of 3.1% in GDP, public debt would grow to 94.6%.

## Box 2 Shadow banking in Croatia

The recent global financial crisis has revealed the important role of the risk inherent in a part of the financial system that has been partially or completely beyond the reach of regulations and has, due to its size and the links among financial institutions, significantly contributed to the speed of the diffusion and the costs of the crisis. The role of what are sometimes termed shadow banks was especially significant in countries with developed financial systems. A discussion of possible improvements to shadow banking regulation requires an understanding of the basic features of shadow banks and an assessment, based on available data, of the size of this financial system segment and its systemic importance. This box aims to shed some light on the term shadow banking and the importance of examining the operations of shadow banks from the point of view of financial stability and of assessing their role in the Croatian financial system. A preliminary analysis of the financial system and business practices that may be characterised as shadow banking, carried out for this purpose, was based on the financial account statistics, which provide a compilation of the available data of the CNB, Ministry of Finance, FINA and HANFA.

### General remarks on shadow banking

The European Commission defines shadow banking as the system of credit intermediation that involves entities and activities that are outside the regular banking system. Such intermediaries have the following main features:

- maturity transformation – long-term investments are financed by short-term borrowing;
- liquidity transformation – less liquid types of assets are financed by highly liquid liabilities;
- direct or indirect use of financial leverage – investments are financed by borrowing;
- credit risk transfer – the risk that a debtor will not be able to service its obligations is transferred from the lender to a third party;
- accepting funds in a form similar to deposits;
- funds are often raised in the securitisation process, by securities lending and repurchase transactions; and
- a possible participation in regulatory arbitrage in order to circumvent restrictions, that is, regulations governing other financial intermediaries (mostly banks), with these activities often being financed by banks.

In practice, shadow banking usually implies money market and other funds or products that have the characteristics of deposits and are sensitive to mass withdrawal of funds, parties included in the securitisation process, investment funds or financial intermediaries such as leasing companies, which grant loans or intensively use financial leverage, including hedge funds, private equity funds and financial entities extending loans or loan guarantees, insurance and reinsurance companies extending loans or loan guarantees and factoring companies that may be used to avoid large exposure restrictions applying to other financial institutions.

Shadow banking should not be perceived as a problem if risks are appropriately managed and if investments are made in the types of assets whose value is justified by fundamentals. This is because shadow banks

provide additional financing opportunities, offer an alternative to investing in bank deposits, channel funds more efficiently because of a higher degree of specialisation and enable risk diversification due to a lower reliance on the banking sector (European Commission, 2012).

However, in practice, shadow banks usually act procyclically, while an intensive use of leverage, the circumvention of regulations and lack of rules governing the failure of such institutions additionally threaten the overall financial system, especially if they are systemically important. Risks to financial stability include risks of potential budget expenditures for the bailing out of these institutions, risks to investors in shadow banks and risks to affiliated institutions with large exposures to such institutions, which can also be materialised in the form of fiscal costs. Given that shadow banks are not isolated from the remaining part of the financial system, problems that they might have can spread very quickly through financial markets and other financial intermediaries to other financial institutions, especially banks, and can also result in the cross-border spillover of instability.

These risks indicate that there is a need for a coordinated action of the regulatory authorities for bank and non-bank financial intermediaries with a view to reducing systemic risks that, as a rule, generate high costs. One of the main steps towards this goal is to examine the size and structure of shadow banks and their links with other financial institutions.

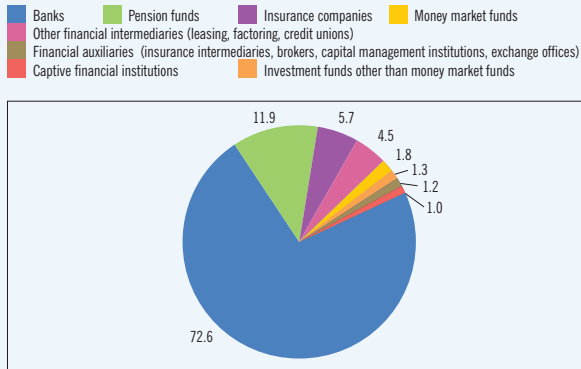
### An analysis of shadow banking in Croatia

An analysis of potential risks related to shadow banking is based on an analysis of the structure and connections between the segments of the financial system, risks related to maturity and liquidity matches and mismatches and the degree of the use of financial leverage.

The segment of the non-bank financial institutions is quite small compared to the banking sector (Figure 1). The share of assets of non-bank financial institutions in the total assets of the financial system at the end of June 2015 was approximately 27%. As the share of banks continuously exceeds 70%, Croatia's financial system is classified as a bank-centric system, common in most European countries.

In order to get a general impression of mutual exposures of financial institutions they are presented not only by figures and tables, but also as charts with data on the relative size of specific non-bank financial institutions, the degree to which they use leverage and mutual exposures as well as claims and obligations against the government, the rest of the world, enterprises and households that exceed a certain share in each sector's assets (Chart 1). A chart analysis of inter-sectoral relations illustrates the positions of the government, banks and non-financial corporations (Charts 1 and 2). This confirms the importance of stable public finances and a sound banking sector for the safeguarding of the financial stability of the system as a whole. Specifically, given the considerable exposure of non-bank financial institutions to the government, potential problems in the public sector would be transferred through the network of financial intermediaries to banks and jeopardise the financing of other sectors of the economy. Such losses would eventually be borne by the household sector, which is the biggest lender to and investor in the observed financial intermediaries (Chart 2).

Figure 1 Structure of Croatian financial sector assets, end-June 2015



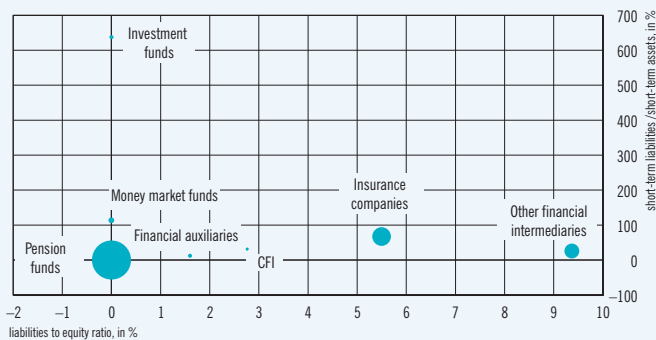
Source: CNB – financial accounts.

The maturity mismatch of assets and liabilities of non-bank financial institutions measured by the ratio of short-term liabilities to short-term assets does not represent a systemic risk as in most sectors it is below 100%. Operational risk of individual institutions, which should also be taken into account, can be assessed only by on-site examination. Investment funds are an exception, as can be expected considering that investments in these funds are usually treated as short-term liabilities, while investments in debt and equity securities are regarded as long-term assets although the character of such investments primarily depends on the liquidity of these instruments (Figure 2).

The degree of the use of leverage across sectors does not suggest an excessive use of leverage in the financing of activities in most sectors, with the exception of other financial intermediaries, which is an indication of potential risks in their operations (Figure 2).

A relatively large short-term exposure of some non-bank institutions to banks points to a potential risk of transferring shocks from banks

Figure 2 Degree of maturity mismatch and degree of leverage use, by the type of non-bank financial institutions, end-June 2015



Source: CNB – financial accounts.

to these institutions. As regards the type of operations, money market funds and financial auxiliaries have the largest short-term exposures to banks. The share of money market funds' short-term claims against banks in these funds' total assets is 50% and the comparable share for financial auxiliaries is 44% (Figures 3 and 4). From the perspective of banks, the total exposure of non-bank financial institutions to banks accounts for approximately 4.3% of bank assets, 4.1% of which goes to short-term exposures that mainly includes deposits being therefore not assessed as systemic risk.

The short-term exposure of banks to non-bank financial institutions is negligible in relation to their total assets and the total assets of the financial sector so that it does not constitute a systemic risk (Figures 5 and 6). Overall, banks have the largest exposure to other financial institutions, amounting to 1% of total bank assets, accounted for in equal amounts by short-term loans, long-term loans and equity investments.

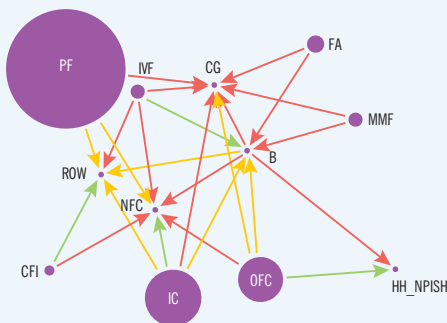
A high degree of non-bank financial institutions' exposure to the government sector suggests that there are increased risks related to possible difficulties in the financing or refinancing of public debt, which would, if they materialised, cause difficulties in the whole financial system (Figures 7 and 8, Chart 1). The largest short-term exposures of non-bank financial institutions to the government in relation to individual sectors' assets are those of financial auxiliaries and money market funds, and the largest long-term exposures, in addition to those of the two mentioned sectors, are the exposures of insurance funds and pension funds.

A relatively strong reliance of a part of the non-bank financial system on foreign financing sources was also assessed as a potential systemic risk because these sources can be volatile and, in the case of funds being withdrawn, lead to the spillover of risks to the rest of the financial system (Figures 9 and 10, Chart 2). If captive financial institutions, due to their small share in the total financial system, are excluded, other financial intermediaries have the largest short-and long-term exposures to foreign financing sources. A more detailed analysis of their liabilities shows that long-term loans account for 65% of total liabilities and for almost 89% of foreign liabilities of these intermediaries.

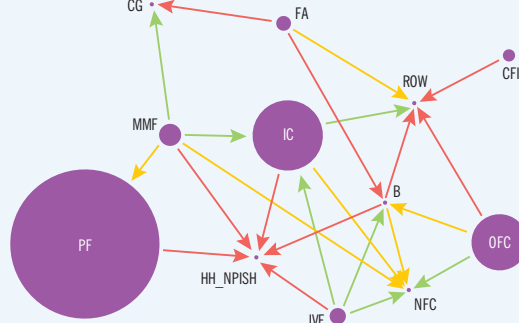
This analysis suggests that the share of non-bank financial institutions in the Croatian financial system and the maturity structure of their liabilities and claims at the moment do not pose a risk that could jeopardise the financial stability of the overall system. However, due to large short-term exposures of non-bank financial institutions to banks, there are significant risks of potential shocks to liquidity and solvency of bank operations spilling over to these institutions. In addition, a potential systemic risk arises from the high exposures of non-bank financial institutions to the government, which would invariably materialise in case of any difficulties in public debt servicing and affect the rest of the financial system. Furthermore, some non-bank financial institutions rely heavily on foreign financing sources, which could create difficulties should volatility and turbulences in international financial markets increase. An analysis of the segments of the non-bank part of the financial system shows that other financial intermediaries rank prominently in the group

## Charts 1 and 2 Mutual claims and liabilities of banks and non-bank financial institutions

Assets



Liabilities

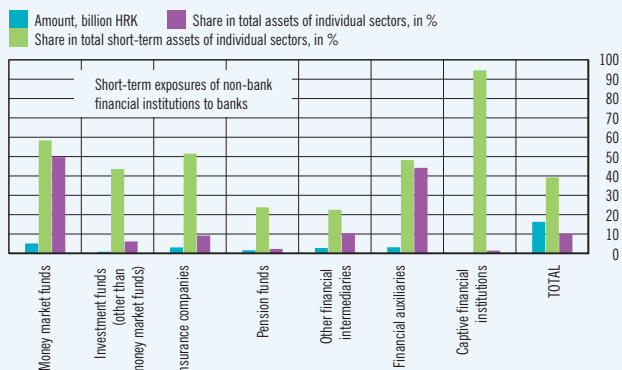


Notes: The size of a circle is proportionate to the size of assets of individual sectors, taking into account only non-bank financial institutions. Red arrows mark claims exceeding 20% in assets or liabilities of individual sectors, yellow arrows refer to 10% of such claims and grey arrows to 5%.

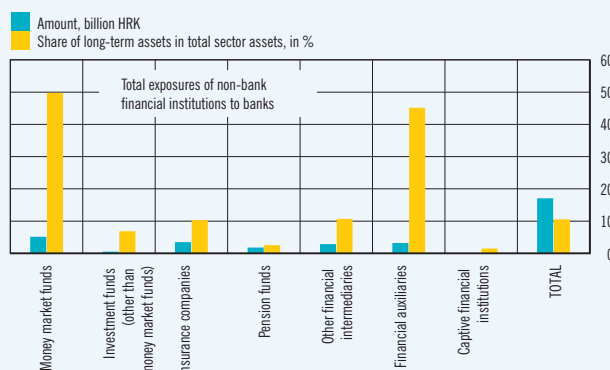
Marks: B – banks; PF – pension funds; IC – insurance companies; IVF – investment funds (other than money market funds); MMF – money market funds; OFC – other financial companies; FA – financial auxiliaries; CFI – captive financial institutions; CG – central government; ROW – rest of the world; NFC – Non-financial corporations; HH\_NPISH – households.

Source: CNB – financial accounts.

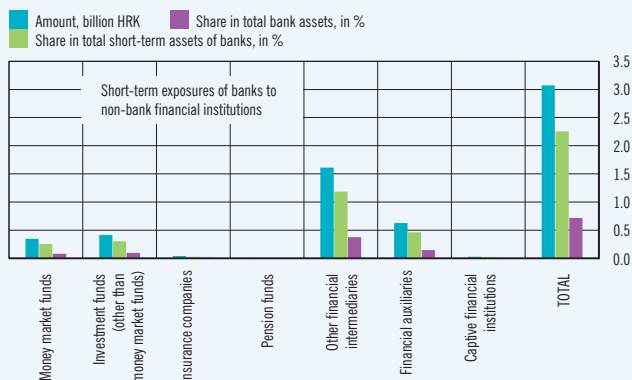
## Figures 3 and 4 Exposures of non-bank financial institutions to banks and maturity structure of these exposures (claims of non-bank financial institutions against banks), end-June 2015



Source: CNB – financial accounts.



## Figures 5 and 6 Exposure of banks to non-bank institutions (bank claims against non-bank financial institutions), end-June 2015



Source: CNB – financial accounts.

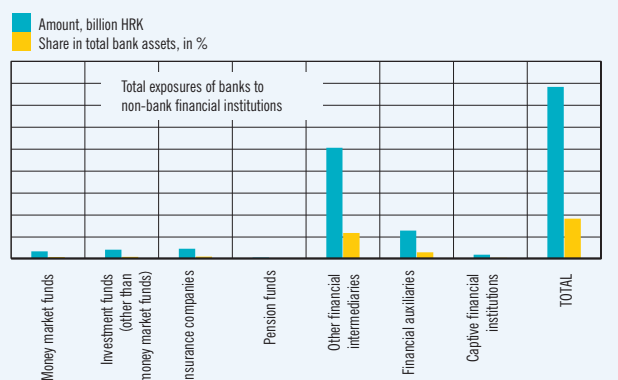


Table 1 Matrix of mutual exposures of individual sectors within the financial system, end-June 2015  
billion HRK

Liabilities	Claims									
	Banks	Pension funds	Insurance companies	Other financial intermediaries (leasing, factoring, credit unions)	Money market funds	Investment funds other than money market funds	Financial auxiliaries	Captive financial institutions	Government	Rest of the world
Banks	....	1.8	3.5	2.9	5.1	0.5	3.2	0.1	86.7	113.2
Pension funds	0.1	...	0.0	0.0	0.1	0.0	0.0	0.0	48.5	0.0
Insurance companies	0.5	0.0	...	0.6	0.0	0.0	0.1	0.0	17.3	2.7
Other financial intermediaries (leasing, factoring, credit unions)	5.1	0.0	0.3	...	0.0	0.0	0.0	0.0	3.8	23.7
Money market funds	0.3	2.0	0.9	0.2	...	0.1	0.3	0.0	5.0	0.4
Investment funds other than money market funds	0.4	0.3	0.5	0.0	0.0	...	0.2	0.0	1.7	0.3
Financial auxiliaries	1.3	0.0	0.1	0.0	0.0	0.2	...	0.0	3.1	0.6
Captive financial institutions	0.2	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	8.6
Government	19.5	0.0	1.4	0.1	0.8	0.0	1.7	0.0	...	1.6
Rest of the world	46.4	9.6	4.8	0.4	0.0	2.2	0.1	0.4	124.5	...

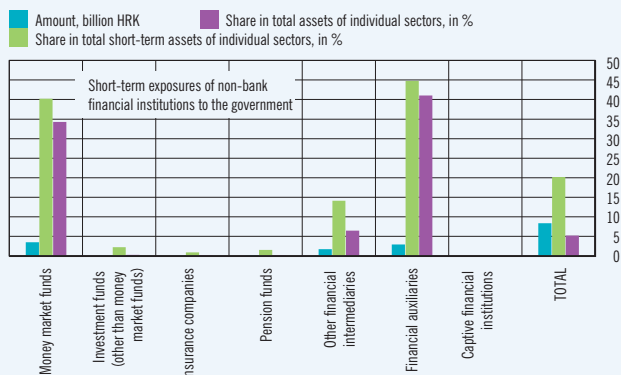
Source: CNB – financial accounts.

of institutions carrying the highest risk due to their high degree of leverage and significant short-term and total exposures to foreign financing sources.

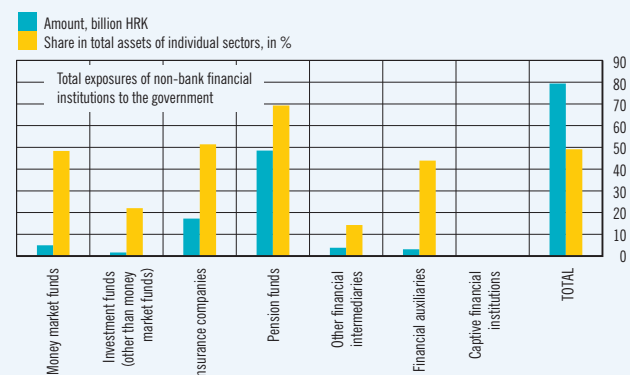
One of the most important recent actions aimed at strengthening the regulatory framework for all segments of the financial system, reducing the room for regulatory arbitrage and shadow bank operations is the establishment of the Financial Stability Council. The Council was established pursuant to the Recommendation of the European System-

ic Risk Board on setting up an authority in charge of macroprudential policy, in view of previously experienced circumvention of central bank measures by channelling operations to less regulated parts of the financial system or abroad. In this way, efficient coordination among institutions competent for the supervision of all financial institutions that might influence financial stability is ensured: the Croatian National Bank, the Croatian Financial Services Supervisory Agency, the Ministry of Finance and the State Agency for Deposit Insurance and Bank Rehabilitation.

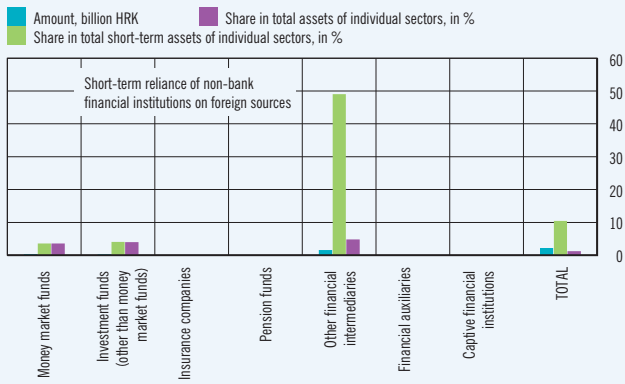
Figures 7 and 8 Exposure of non-bank financial institutions to the government and maturity structure of these exposures (claims of non-bank institutions against the government)



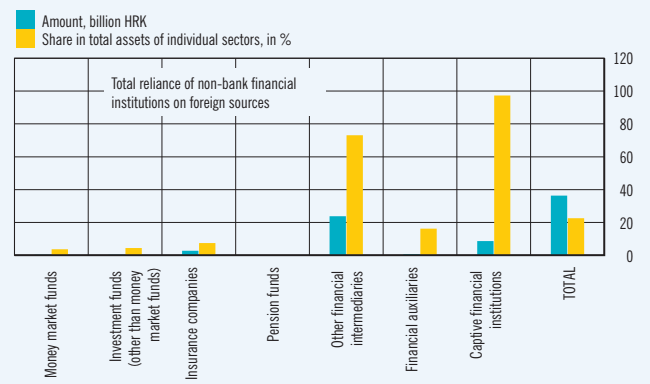
Source: CNB – financial accounts.



Figures 9 and 10 Reliance of non-bank financial institutions on foreign financing sources and maturity structure of these sources

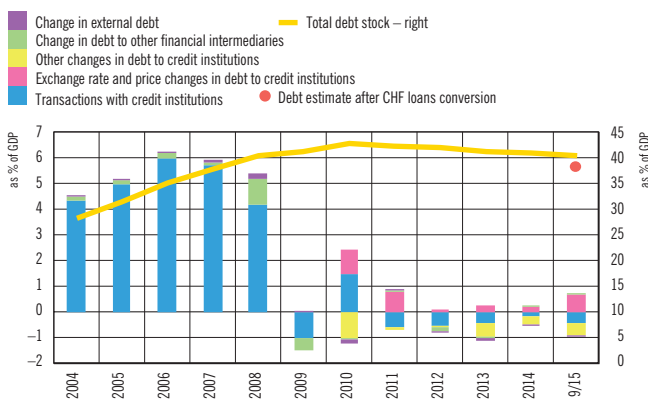


Source: CNB – financial accounts.



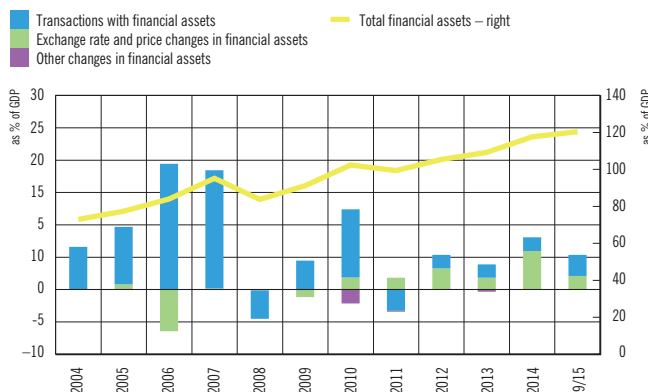
# Household sector<sup>2</sup>

Figure 36 Change in and stock of household debt



Sources: HANFA and CNB.

Figure 37 Change in and stock of household financial assets



Sources: HANFA and CNB.

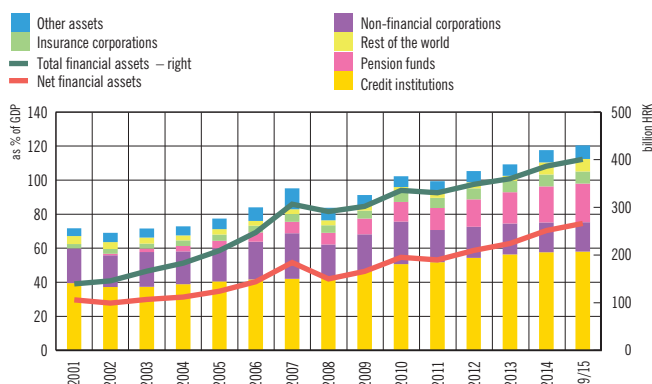
The several-year-long downward trend in the aggregate debt and vulnerability of the household sector continued in the first three quarters of 2015. The process of conversion of loans in Swiss francs will further reduce debt, but also increase the interest rate risk in the forthcoming period. Despite this and the expected economic growth, as well as positive incentives from the labour market, no acceleration of new, particularly of long-term, lending is expected in the course of 2016, partially also under the effect of heightened consumer awareness of the risks that have visibly materialised in the crisis period.

After growing during the first quarter of the previous year, driven by the sharp appreciation of the Swiss franc, household sector debt decreased again in the rest of 2015 and at the end of September it accounted for 40.4% of GDP (Figure 36). This was due not only to a moderate increase in aggregate income, but also to the continued decrease in debt of this sector related to transactions with credit institutions (by -0.4% of GDP) and the increase in the write-off and other adjustments of debt of this sector (by -0.5% of GDP), dominated by the sale of household placements related to the continuation of the process of addressing the non-performing placements of this sector in the balance sheets of credit institutions. The exposure of the

<sup>2</sup> The published data refer to statistical data and in this issue do not include the effect from the conversion of CHF-denominated loans into EUR-denominated loans, regulated by the amendments to the Consumer Credit Act of 30 September 2015. Nevertheless, the assessment of these effects on the total debt of the household sector is added in Figure 36 and Figures 48 and 49. Exact and full effects will be known in the subsequent period.

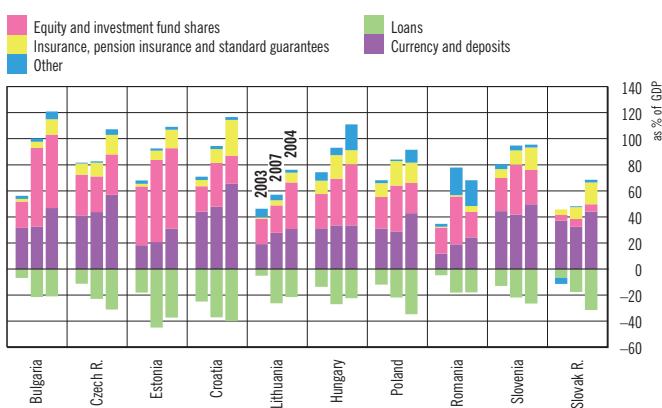


Figure 38 Household financial assets



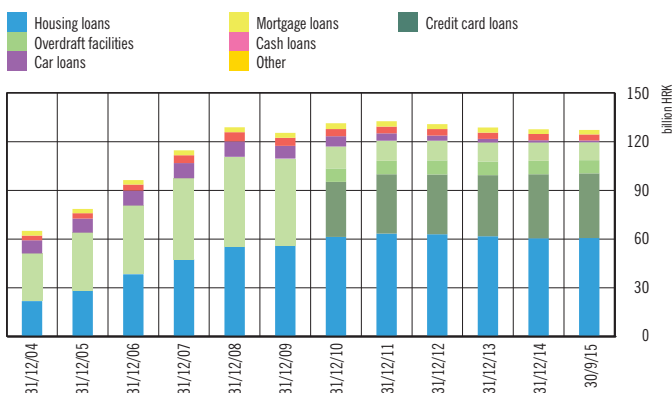
Source: CNB.

Figure 39 Net financial assets of households in CEE countries



Source: Eurostat.

Figure 40 Household loans by purpose



Note: Cash loans and overdraft facilities have been excluded from the category other household loans since the end 2010 due to the fact that they have become new categories.  
Source: CNB.

household sector to other financial intermediaries, accounting for slightly over 5% of total debt in the total debt structure, remained almost unchanged. By the end of September 2015, total debt had declined by  $-0.5\%$  at an annual level (Figure 41), while the correction was much higher ( $-6\%$ ) if the estimated effect of the conversion of loans in Swiss francs<sup>3</sup> is included in the calculation of debt.

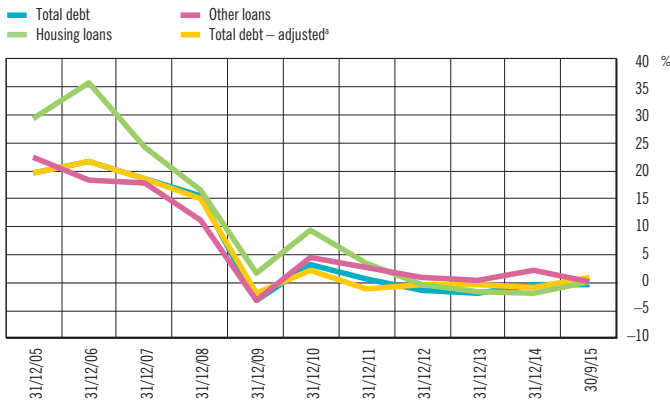
In 2015, financial assets of households increased additionally and stood at slightly above 120% of GDP (Figure 37) at the end of September, their structure did not change significantly relative to the end of 2014 (Figure 38). Most of the financial assets of this sector were still invested in credit institutions (about 58% of GDP) in the form of deposits, as in Central and Eastern European peer countries (Figure 39). This distribution of financial assets additionally stresses the need for maintaining the stability of banks. The largest contribution to the growth in assets, in addition to the usual seasonal increase in currency in circulation, as in the previous periods, was attributed to the payments to mandatory pension funds and the growth of deposits. Deposits, accounting for 48% of financial assets, are relatively highly concentrated: 20% of investors hold 94% of total deposits (see Box 3 Preliminary measurements of the deposit concentration risk). For this reason, the positive effect of the growth of financial assets on the aggregate risk of this sector is limited because of its uneven distribution.

The prolonged period of recession has significantly weakened the demand for loans, which was not even driven by the somewhat eased credit standards of total loans (Figure 44) nor by a mild recovery of the labour market (Figure 45), evident primarily in the halted decline in employment and the rise in the nominal or real net wage (each by about 2% from March). Historical experience and the weakened borrowing capacity of households resulted in an altered currency structure and purpose distribution of new borrowings (the decrease in new housing loans and new car loans with the parallel larger reliance on cash loans and credit card loans over the recent years). This was partially attributed to the easing of credit standards for consumer and other loans in that period (Figure 44). The decrease in all forms of new long-term loans, including housing loans (Figure 43), with relatively stable credit standards<sup>4</sup> is related to the mentioned trends in the economy and changes in consumer habits. Thus total newly granted loans at a semi-annual level decreased additionally by about 10% (Figure 42), which was reflected in total loan amounts. In the observed half-year period, households continued to decrease their debt in all forms of loans, except

3 The conversion of the actual loans in Swiss francs into those in euros is accompanied by a write-off of a part of their remaining principal amount with the aim of equalising the status of debtors with loans in the Swiss franc with that of debtors with loans in the euro, in accordance with the intentions of the government of the Republic of Croatia. Moreover, a part of the annuities paid earlier, representing the overpayment relative to the equivalent loan in euros, will be returned to debtors. All of this will reduce the total debt of this sector.

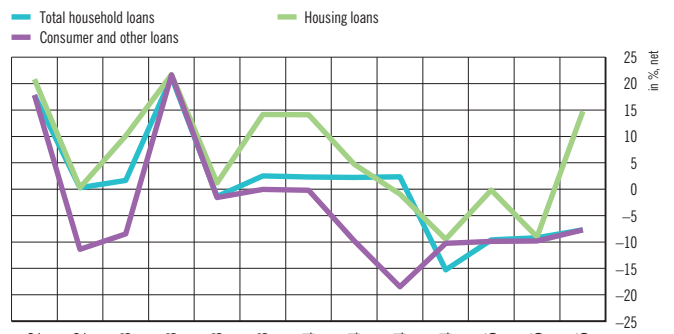
4 The shown significant tightening of the standards for granting housing loans in Figure 44 may be considered an atypical value (outlier) because it is the consequence of the tightening of group risk policies only at one bank.

Figure 41 Annual rate of change in debt and loans



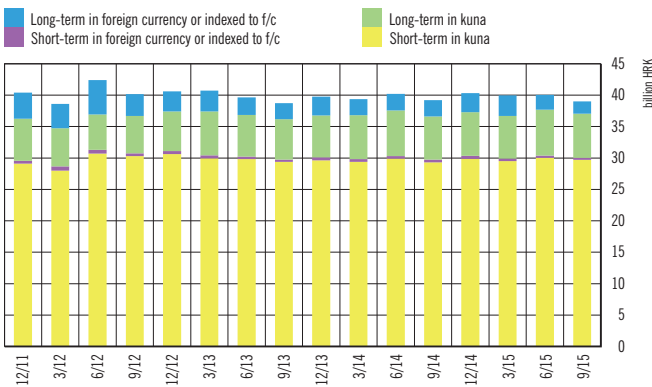
\* Denotes total debt growth rate adjusted by exchange rate and price changes. Source: CNB.

Figure 44 Change in household lending criteria in the last three months



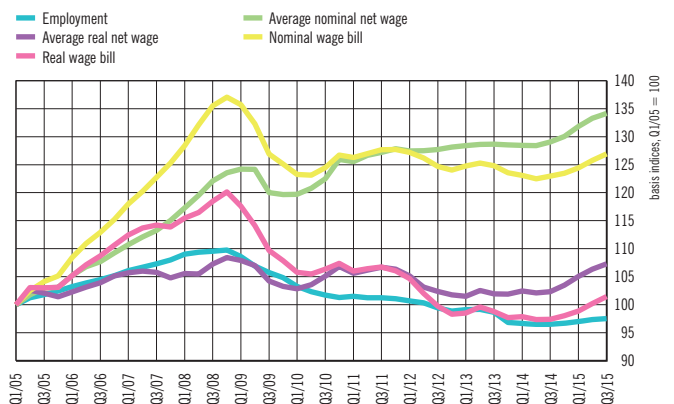
Note: Positive and negative values denote the tightening and easing of credit standards, respectively. Source: CNB.

Figure 42 Maturity breakdown of newly-granted household loans



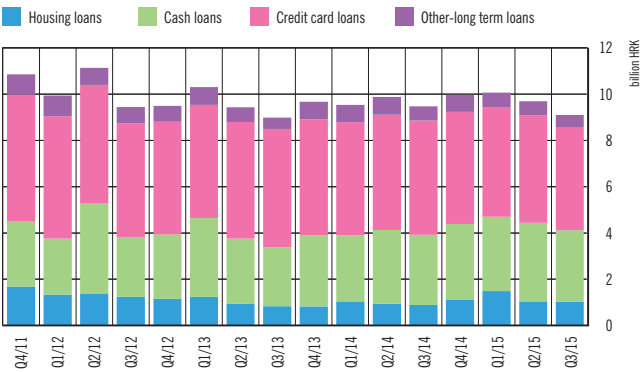
Source: CNB.

Figure 45 Employment and wages (seasonally adjusted)



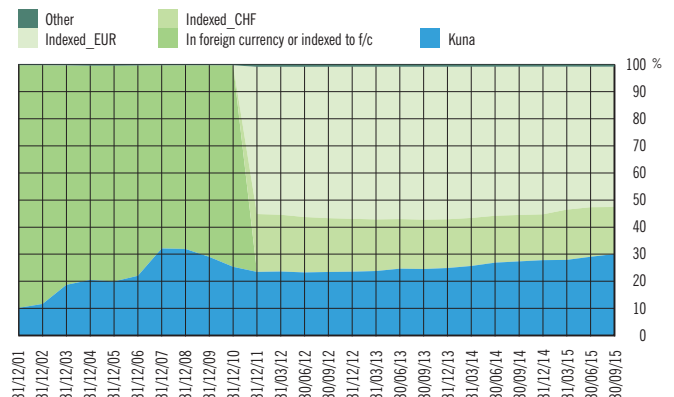
Source: CBS and CPII.

Figure 43 Newly-granted long-term household loans by purpose



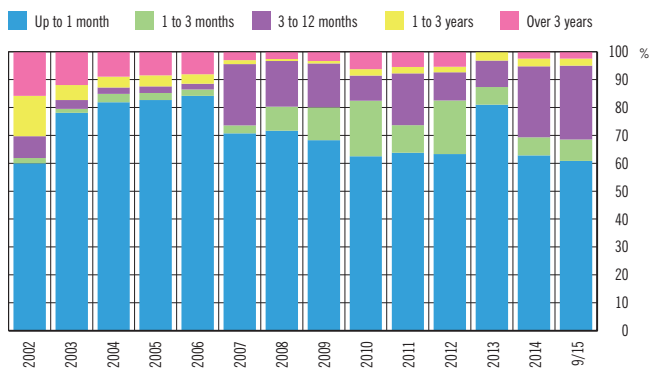
Source: CNB.

Figure 46 Currency breakdown of household loans



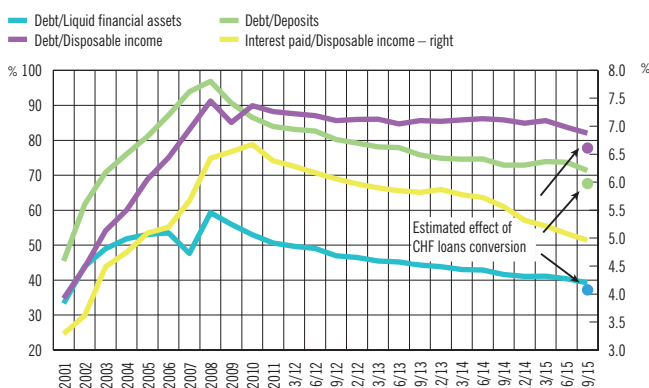
Source: CNB.

Figure 47 Household loans by interest rate variability



Source: CNB.

Figure 48 Household debt and debt burden



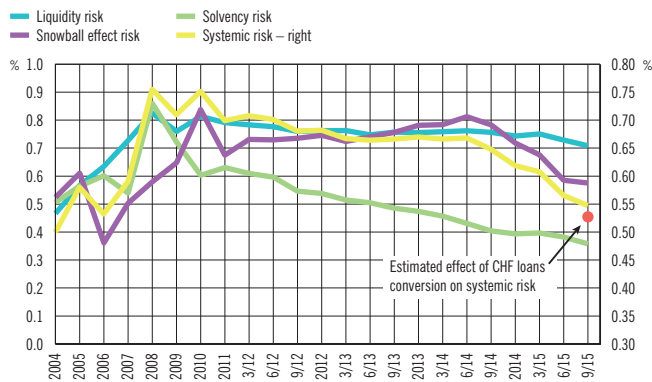
Source: CNB.

cash loans, the balance of which had increased by 1% (Figure 40) at the end of September from March. Housing loans decreased further by about 3%<sup>5</sup> relative to March, while their registered balance remained almost unchanged at an annual level.

The structure of household debt by currency and possible changes in interest rates still point to the high degree of exposure of households to exchange rate risk and interest rate risk. The exchange rate risk declined slightly (Figure 46) in the observed period because of the growth in the share of kuna loans (at the end of September it stood at 30% from 27% at the end of January). However, a significant reallocation of the exchange rate risk is expected in the forthcoming period. The

5 The total amount of housing loans is adjusted by exchange rate and price changes, at the end of September 2015 the recorded decline in housing loans was slightly smaller (by 2% relative to March 2015).

Figure 49 Indicators of vulnerability in the household sector<sup>3</sup>



<sup>3</sup> Household sector vulnerability is measured by the household systemic risk, i.e. by the average of liquidity risk (LR), solvency risk (SR) and "snowball effect" risk (SNR) which are defined as follows:

$$LR_t = 0.5 \cdot \frac{\text{Debt}_t}{\text{Disposable income}_t} + 0.5 \cdot \frac{\text{Interest payments}_t}{\text{Disposable income}_t}$$

$$SR_t = \frac{\text{Debt}_t}{\text{Net financial assets}_t}$$

$$SNR_t = \frac{\text{Interest payments}_t}{\frac{\text{Debt}_t + \text{Debt}_{t-1} + \text{Debt}_{t-2} + \text{Debt}_{t-3}}{4}} \cdot \left( \frac{\text{Disposable income}_t}{\text{Disposable income}_{t-4}} - 1 \right)$$

Sources: HANFA and CNB.

Act on Amendments to the Consumer Credit Act adopted in September 2015 prescribes the conversion of all housing and other consumer loans indexed to the Swiss franc into loans indexed to the euro. Despite the continued high exposure to the exchange rate risk, under these amendments the majority of the loans will be indexed to the currency whose exchange rate stability is one of the main indirect objectives of the monetary policy, which will minimise the effect of abrupt exchange rate fluctuations, beyond the influence of the CNB, on the repayment of household loans. In parallel with the enhanced transparency achieved by the publication of the *Information list containing the offer of loans in domestic currency for consumers*<sup>6</sup> and the better provision of information to consumers prescribed by the *Decision on the content of and the form in which consumers are provided information prior to contracting banking services*<sup>7</sup>, there has been an endeavour to reduce the exchange rate risk further. Although the above governmental interventions concerning the conversion of loans in Swiss francs will reduce the aggregate debt and vulnerability of this sector, the effects are not linear for all households and depend on the time when the loan in Swiss francs was granted and the interest rate applied in the conversion. Also, a greater proportion of the aggregate reduction of the risk will be provided by households with higher initial loan amounts, and they, on average, are less likely to be vulnerable. For instance, at the end of October 2013, about 2.5% of credit lines included loans granted in an amount exceeding CHF 200,000, accounting for about 11% of the

6 [www.hnb.hr](http://www.hnb.hr).

7 <http://www.hnb.hr/propisi/odluke-nadzor-kontrola/2015/e-odluke-sadrzaj-oblik-info-potrosacima.pdf>

total balance of these loans<sup>8</sup>. The effect of the conversion on the interest rate risk should also be taken into account. Although loans indexed to the Swiss franc were previously statistically included in the category of loans with variable interest rates since the temporary limitation of the interest rate amount was valid only in the conditions of a significant appreciation of the exchange rate (above 20%), they were effectively fixed and did not impact the interest rate risk. For this reason, in the forthcoming period, after the implementation of the conversion of CHF-denominated loans, a considerable increase in the interest rate risk is expected, despite the fact that it will not be evident in statistical data showing that the structure of loans according to the interest rate variability in the observed half-year period did not change significantly (at the end of September, as much as 95% of loans was granted with the possibility of a change in interest rates within a year). Despite this, households continue to be highly exposed to the risk of the rise in loan repayments because of the change in interest rates (Figure 47).

Several-year trends of improvement in the indicators of household debt and debt servicing burden continued in 2015 (Figure 48). These trends, along with the mentioned slight decrease in debt and the parallel increase in deposits, and consequently of liquid assets, were also supported by new regulatory amendments during the year. On one hand, the amendments to the

Income Tax Act impacted the increase in household disposable income<sup>9</sup>, and amendments to the Civil Obligations Act impacted the decrease in the cost of interest paid, to some extent, which decreased by 7% at an annual level and the resulting improvement in the indicators of the coverage of the amount of interest paid by disposable income. The described trends in the decrease in debt and interest burden for households and the increase in financial assets and disposable income reflected favourably on the observed individual forms of household sector risk, mostly on the snowball effect, which started to improve in mid-2014. For this reason, the aggregate systemic vulnerability of this sector was also reduced (Figure 49).

The decrease in total debt through the expected process of the conversion of loans in Swiss francs will have favourable effects on the improvement of indicators of debt in the forthcoming period. However, it does not seem that this one-off effect and the expected economic recovery as well as positive signals from the labour market will succeed, without a significant and long-lasting recovery of disposable income and stronger positive developments in the real sector, in accelerating any new and particularly long-term lending. Nevertheless, positive developments in the economy will certainly support consumer optimism and contribute to the decline in their aversion to borrowing.

8 [http://www.hnb.hr/priop/2015/hrv/hp15092015\\_CHF.pdf](http://www.hnb.hr/priop/2015/hrv/hp15092015_CHF.pdf)

9 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.

## Box 3 Preliminary measurements of the deposit concentration risk

The consequences of the recent financial crisis have warned unambiguously of the systemic dimension of risk and it is precisely to this context that macroprudential policy instruments have tried to adjust. However, some risks have partially remained in the shadow of traditional supervisory tools, such as the concentration risk or the inappropriately heavy reliance on a restricted number of clients in lending (on the asset side<sup>1</sup>), i.e. in the collection of funds (on the liability side<sup>2</sup>). Both of these risks may have a destabilising effect because the disruption to which a group of clients or creditors might potentially be exposed is automatically turned into an idiosyncratic shock for the individual credit institution.

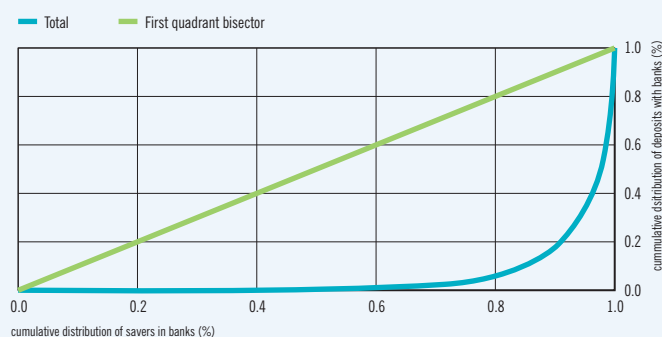
However, this risk may easily become systemic as a result of contagion among institutions, which may arise because of their interconnectedness or the perception of similar models of operation, leading to an abrupt and considerable outflow of deposits. In addition, the concentration of liabilities reflects inequalities in the general distribution of income and assets<sup>3</sup>, so that, as a rule, it is reflected on the balance sheets of *all* credit institutions. This is also confirmed on the example of Croatia, which is analysed in this Box with the aim of arriving at a better understanding of the mentioned risk, its quantification and adequate inclusion in the stress testing of institutions.

### Characteristics of the concentration of deposits in domestic banks

Domestic household deposits account for almost a half of the financial assets of the sector and approximately 8% of the total financial assets of all sectors (households, non-financial corporations, financial insti-

tutions, government and non-residents). In the period from 2001 to mid-2015, their amount more than doubled and the annual rates of change in the expansionary period were much higher than those in the recessionary period that followed. For the purpose of detecting the problem of concentration on the liability side, micro data on transactions, savings and time deposits<sup>4</sup> of banks and savings banks were analysed. The analysis did not include information on deposits with housing savings banks and deposits of non-residents. Although a household is often used as the basic unit for the population in similar surveys, in this case, due to the limited data, the analysis was conducted only on a sample of depositors, i.e. at the level of individual clients (that cannot be grouped into a household)<sup>5</sup>.

Figure 1 Lorenz curve – savings of natural persons in the Republic of Croatia as at 31 March 2014



Note: The shown data refer to the positive values of transaction, savings and time deposits with banks and savings banks and do not include the deposits of non-residents.  
Source: CNB.

Table 1 Descriptive statistics of household deposits as at 31 March 2014

	Total	Transaction deposits	Savings deposits	Time deposits
Number of natural persons	3,011,881	2,274,784	1,639,333	742,728
Aggregate (HRK)	173,399,039,741	18,112,564,672	16,979,159,563	138,307,315,506
Average (HRK)	57,572	7,962	10,357	186,215
Median (HRK)	1,454	455	257	56,756
Gini coefficient	0.89	0.87	0.89	0.73
Average weighted nominal interest rate on balances	2.29%	0.13%	0.25%	2.83%

Note: The shown data refer to the positive values of transaction, savings and time deposits with banks and savings banks and do not include the deposits of non-residents.  
Source: CNB.

1 As prescribed by the Decision on risk management of 1 January 2014.

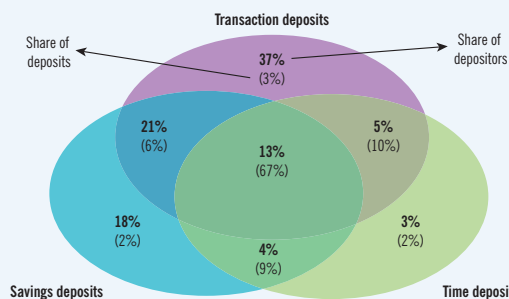
2 As prescribed by the new regulatory framework for the calculation of the liquidity coverage ratio.

3 Although it is difficult to state the ratio of concentration of income and assets, i.e. of their individual forms, Croatia probably fits into the general picture of a more pronounced concentration of financial assets relative to real and total assets.

4 A transaction account is the account through which an account holder in the reporting institution settles his payables and through which he collects his receivables. Savings deposits are deposits without a predetermined date of maturity or period of notice, which the depositor cannot debit by issuing a cashless payment order. Time deposits are deposits that cannot be used for payments because the depositor renounces their use for a specific agreed time.

5 The change in the units of observation (individuals, household or another group) would impact the measurement of the concentration, but it cannot be stated reliably in which direction it would move (increase or decrease).

Figure 2 Schematic representation of the number of depositors and the amount of deposits depending on the type of deposit as at 31 March 2014



Note: The shown data refer to the positive values of transaction, savings and time deposits with banks and savings banks and do not include the deposits of non-residents.  
Source: CNB.

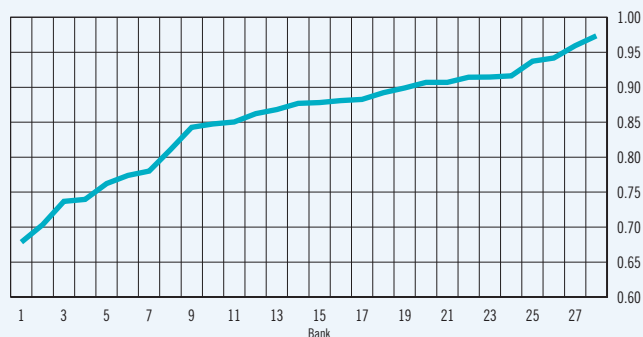
The analysed data point to the high concentration of the system because the Gini coefficient<sup>6</sup>, one of the most frequent measures of concentration, depending on the type of deposit, ranges from 0.73 to 0.89 (Table 1 and Figure 1). The analysis of aggregate data gives rather interesting results: 20% of the largest depositors held as much as 94% of all deposits at the end of the first quarter of 2014.

At the same time, more than one third of depositors in Croatia, 37% of them, use only transaction accounts, in which only 3% of total deposits is deposited, which effectively means that they are used only for current needs and that savings are not their primary aim. On the other hand, 13% of the savers hold all three of the observed forms of deposits, accounting for a total of 67% of all deposits (Figure 2). As expected, time deposits account for the largest percentage (60%) of this amount, while savings and transaction deposits account for the remaining 7% in equal amounts.

#### The use of results of the concentration risk analysis within the stress testing

In order adequately to include the detected risks of the large uneven distribution of household deposits in the system into the current stress testing exercise, the concentration of deposits of the individual credit institution should be analysed in more detail. The assumption of the outflow of household deposits was already integrated in the existing stress testing framework<sup>7</sup> in the second phase of the integration of the capital and liquidity segment for all institutions that ended the first phase of

Figure 3 Gini coefficient of concentration by banks



Source: CNB.

testing with the solvency below acceptable critical values. This assumed event was triggered by abrupt reputation risks to which the bank was exposed in this situation, and the amount of the outflow in previous testings was equal for all institutions.

However, depending on the presence of the difference between the distributions of deposits in individual credit institutions, the assumption of an even outflow for all institutions will be replaced by the differentiated assumption, according to which initially vulnerable institutions, i.e. institutions with a higher deposit concentration, will be affected by a stronger deposit outflow. For this reason, the Gini coefficient of concentration was calculated for each bank. The obtained results additionally confirm the mentioned argument about the high concentration of deposits at the level of the system since their distribution is concentrated on the right side of the unit interval<sup>8</sup>, but they also reveal the existence of certain differences among institutions (Figure 3).

In order for the mentioned correction on the amount of the outflow in a stress situation to be adequate, this indicator should be viewed in combination with other specificities of credit institutions related to the collection of their sources of funds. Thus, for example, credit institutions that have a somewhat higher level of the concentration of deposits and lower initial liquidity protection<sup>9</sup> will be potentially more vulnerable. It is also true for banks with volatile historical changes in the amounts of deposits<sup>10</sup>, which are also distributed unevenly. Information obtained by combining different indicators was used in the final assessment of vulnerable institutions. Thus in addition to the mentioned LCRs<sup>11</sup> and

6 The Gini coefficient of concentration is defined as the double area of the figure which a Lorenz curve closes with the first quadrant bisector, i.e. with line  $y = x$ . Its value may be any real number between 0 and 1, so that when the value is closer to one, the values of the series are unequally distributed, i.e. the concentration is higher.

7 See Box 5 New methodological approach to stress testing, *Financial Stability*, No. 14, February 2015.

8 According to the analysed data, the Gini coefficient of concentration of each bank in the observed sample is within the interval from 0.65 to 1.

9 Which can be measured by the liquidity coverage ratio (LCR).

10 Which can be measured by the standard deviation of the annual rates of change in deposits.

11 Data for 31 December 2014 were used to obtain higher accuracy of the LCR calculation.

the standard deviation of the change in deposits<sup>12</sup>, the relationship of concentration with the ratio of total granted loans and received deposits, the share of currently marketable assets in total liabilities and the share of household deposits in total liabilities were also analysed.

#### Measures for the reduction of deposit concentration risk

Comprehensive amendments to regulations attempted to mitigate the concentration risk, directly or indirectly, using different measures. The first measure is a higher degree of harmonisation of the rules of financial intermediation within the EU, limiting the cross-border dimension of the concentration risk. The second measure is a resolution package of actions that provides for bail-in instruments, i.e. the transformation of a part of debt into capital (to cover losses), by which the distribution is balanced through banks and countries. The third measure is a stricter and uniquely defined parameter of liquidity coverage (LCR)<sup>13</sup>. The interdependency between the liquidity and concentration risk is partially included in the calculation of the new prudential requirement

through increased outflow rates since one of the risk factors, taken into consideration in determining the category of “deposit risk”, is whether the deposit of an exceptionally large amount (exceeding EUR 500,000) is concerned<sup>14</sup>.

#### Concluding remarks

The concentration risk, regardless of whether it appears on the asset or on the liability side of the balance sheet, i.e. whether it is linked with claims or liabilities, is very important for a credit institution since materialisation of this risk may cause it significant losses. The analysis of micro data for the end of the first quarter of 2014 has shown that a relatively small number of depositors have a large amount of deposits. Although, because of limitations with regard to data, this analysis does not include the time dimension, it is not very likely that concentration is a rapidly changeable category, similar conclusions thus holding true at the present time.

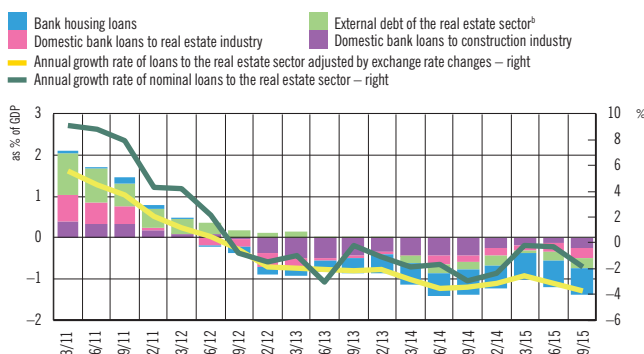
---

12 The standard deviation of the annual rates of change in deposits was calculated on a sample from the beginning of 2012 to the end of the third quarter of 2015.

13 Articles 24 and 25 of the Delegated Regulation (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 with regard to liquidity coverage requirement for Credit Institutions ([http://ec.europa.eu/internal\\_market/bank/docs/regcapital/acts/delegated/141010\\_delegated-act-liquidity-coverage\\_hr.pdf#141010-liquidity](http://ec.europa.eu/internal_market/bank/docs/regcapital/acts/delegated/141010_delegated-act-liquidity-coverage_hr.pdf#141010-liquidity)).

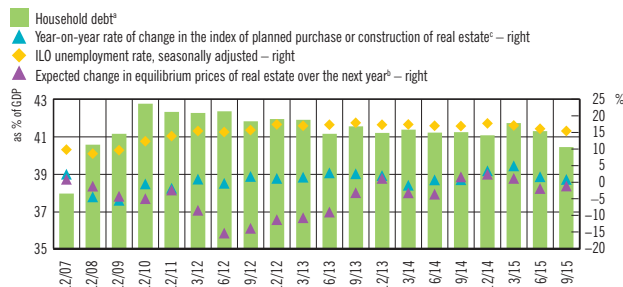
14 To some extent, the above measures are currently being called into question in Croatia precisely because of the harmonisation with EU rules according to which the amount of insured savings increased from HRK 100,000 to EUR 100,000 after the accession to the EU.

Figure 50 Annual change<sup>a</sup> of the real estate sector debt



<sup>a</sup> Changes in debt adjusted by exchange rate changes.  
<sup>b</sup> External debt includes the debt of real estate and construction industries.  
 Source: CNB calculations.

Figure 51 Household debt, unemployment rate, consumer optimism and real estate market expectations



<sup>a</sup> Data for the third quarter do not include the effect of the conversion of CHF loans. <sup>b</sup> Refers to the expected annual change in the same period of the next year (+12 months) and is estimated based on the equilibrium price model, taking into account CNB projections for the main determinants of demand for residential real estate. <sup>c</sup> Index of planning the purchase or construction of real estate was calculated based on consumers' answers to the question on plans regarding the purchase or construction of real estate in the next 12 months from the CNB's consumer confidence survey.  
 Sources: CNB.

The expected continuation of economic recovery and positive signals from the labour market might contribute to the halting of negative trends in the real estate market in the forthcoming period. With the simultaneous expected further increase in disposable income, the indicators of financial availability might improve further. Nevertheless, no sudden increase in demand and liquidity in this market is very likely.

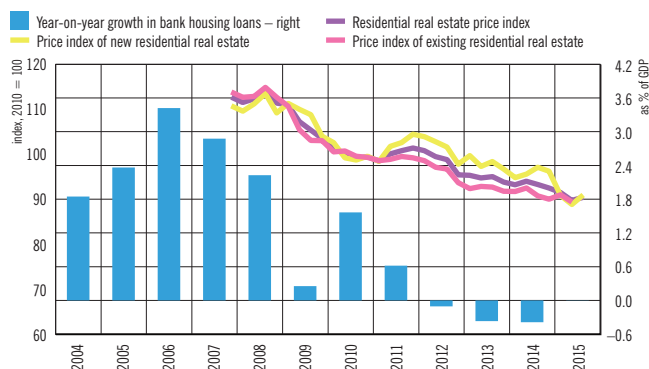
Despite the moderate recovery of economic activity in the first three quarters of 2015, the real estate market was not marked by a significantly increased activity since demand for loans related to this market was still limited, so that the total amount of loans related to the real estate sector continued to decline in that period (Figure 50). At the end of September, the annual rate of change in total debt related to the real estate market thus stood at -2%, i.e. -4% if adjusted by the effect of exchange rate changes. Such debt dynamics was to the largest extent under the impact of the further contraction of housing loans adjusted by exchange rate effects (by -0.7% of GDP). At the same time, domestic corporate lending in construction and real estate activity decreased slightly (by -0.3% of GDP) and their foreign liabilities declined (by -0.2% of GDP).

Despite the present moderate recovery of the labour market and the increased level of consumer optimism (Figure 51), demand for residential property did not change significantly in the observed period, so that real estate prices continued to decline. At

10 In this chapter, developments in the real estate market are analysed and operations of non-financial corporations in the construction and real estate activities are monitored.



**Figure 52 Housing loans and residential real estate price index<sup>a</sup> on a quarterly basis**



<sup>a</sup> The index takes into account qualitative characteristics of the real estate. Source: CNB calculations.

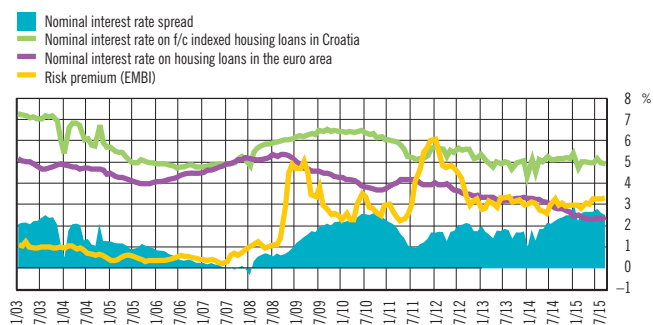
the end of the third quarter, the prices of residential property in Croatia measured by the new real estate price index<sup>11</sup> were down by 3% on the same period of the previous year (Figure 52). In addition to the decrease in the prices of existing real estate (by 1.5%), this was largely attributed to the sharper decline in the prices of newly constructed real estate (by 6.4%), which at an aggregate level declined primarily because of the fall in newly-finished real estate prices on the Adriatic coast<sup>12</sup>. The mentioned decline in prices contributed to the continuation of the favourable aggregate financial availability of residential property (Figure 54). The simultaneous increase in the disposable income of households, partially driven by tax law amendments (Figure 45, Household sector), with almost unchanged interest rates on new housing loans during the previous two years, improved the financial availability of real estate measured as the ratio of the average loan payment to the average disposable income of households. However, despite the slight volatility of the aforementioned interest rates, they were still kept at a relatively high level, thus supporting the present weakened demand for residential real estate. In addition, they do not follow the observed trend of the decrease in comparable interest rates in the euro area, partially reflecting the additionally increased country risk premium (Figure 53), so that the difference in interest rates among them is increasing.

The expected more favourable developments in the labour market and the mild growth of disposable income in the forthcoming period might have a positive impact on the aggregate indicators of financial availability of residential property. Despite

11 The hedonic real estate price index, which was used for monitoring real estate prices in Croatia in the previous period, was substituted for by the new real estate price index calculated by the CBS based on data collected by the Tax Administration.

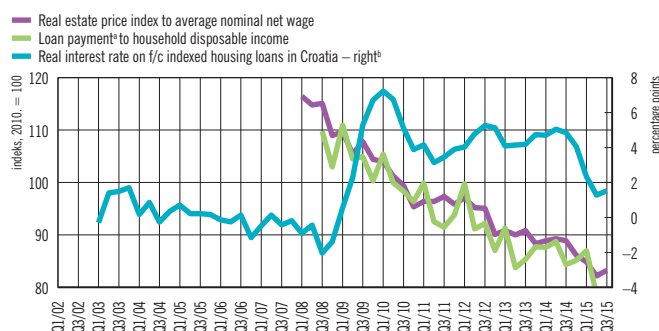
12 Real estate market price indices (Real estate asking price index, Centar Nekretnina) in the observed period pointed to a small decline in prices at an annual level. However, in the third quarter, the mentioned decline was reversed and real estate asking prices increased slightly.

**Figure 53 Comparison of interest rates on newly-granted housing loans in Croatia and the euro area**



Note: Since December 2011, interest rates have been calculated according to the new methodology (for more details on the new interest rate statistics, see *CNB Bulletin*, No. 204, June 2014). Sources: ECB and CNB.

**Figure 54 Financial availability of residential property**

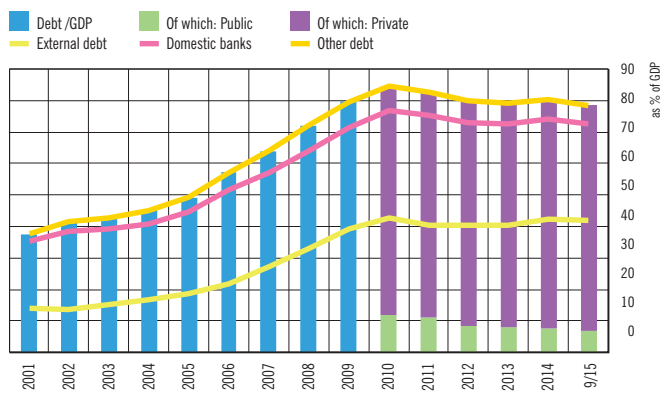


<sup>a</sup> The real interest rate on f/c indexed housing loans was deflated by the change in the average nominal net wage, excluding the effect of the crisis tax, and it is presented as the moving average of three successive time periods. <sup>b</sup> Loan payment refers to an average housing loan for the purchase of residential property of 50 square meters at price relevant in the reference period (measured by real estate price index). Sources: CBS and CNB calculations.

this, no sudden acceleration of demand is likely, primarily because of the changed preferences of consumers, which are partially the consequence of the prolonged recession period. The prolonged unfavourable conditions in the labour market have also changed the creditworthiness of a segment of consumers, which has a negative effect on long-term borrowing. For this reason, with the present limited demand, no significant corrections of residential property prices are expected in the short term and the stabilisation of this market is expected to continue.

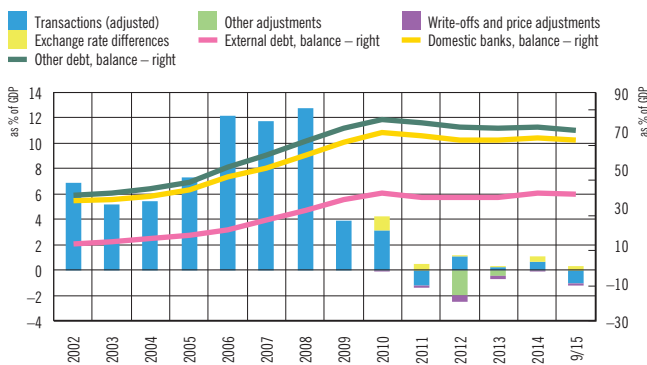
# Non-financial corporate sector

Figure 55 Indebtedness of the non-financial corporate sector



Sources: HANFA and CNB.

Figure 56 Change in and stock of non-financial corporate debt



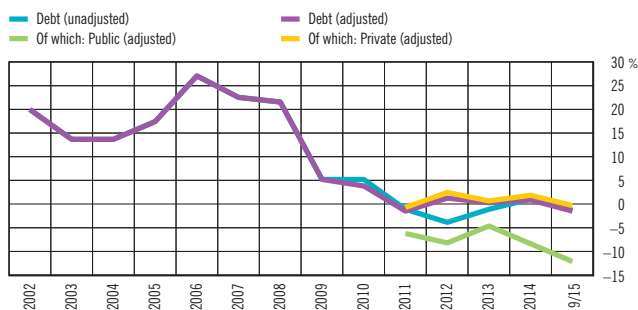
Note: Other adjustments refer to a portion of shipyard debt assumed by the government in June 2012, and the winding-up of a domestic bank and the methodological changes in the recording of fees in 2013.  
Sources: HANFA and CNB.

The several-year downward trend in the total debt of the non-financial corporate sector on a yearly basis (except in 2014) continued in the third quarter 2015 as a consequence primarily of deleveraging by public sector non-financial corporations, while the recovery of economic activity in the same period additionally contributed to the decrease in sectoral indebtedness burden. The vulnerability indicators of the non-financial corporate sector have decreased thanks to improved financial business performance, so the overall sector risk is in decline.

The total debt of the non-financial corporate sector fell in the third quarter 2015, thus reaching the level of below 80% of GDP (78.4%). External debt grew, while the debt with domestic banks and with other sources of funding declined thus having the dominant influence on the decrease in the total debt (Figure 55). The GDP growth during the year contributed additionally to the decline in indebtedness, although this contribution was partially reduced by the slight depreciation of the kuna against the euro, to which the majority of the debt in this sector is indexed to.

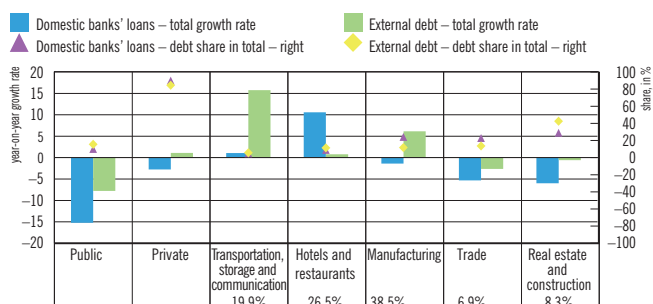
Good business results in 2014, which provide for partial financing from retained profit, have boosted deleveraging. This might be underscored by the fact that newly-granted long-term loans, as well as their balances with domestic banks, have been declining (Figure 60), possibly suggesting weaker reliance on external sources to finance working capital, since enterprises are to a greater extent financed from own funds, i.e. retained profits. On the other hand, external debt growth indicates that conditions are still more favourable and funding sources still more accessible abroad (with parent companies) than at domestic

Figure 57 Annual growth rate of non-financial corporate debt



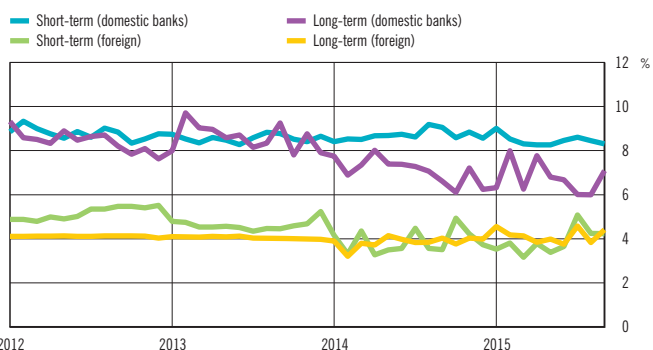
Note: Annual growth rates of non-financial institutions' debt exclude effects of the sale of a portion of claims of a major bank to a company in the direct ownership of the parent bank in December 2012 and 2013, the assumption of a portion of shipyard debt by the government in June 2012, the winding-up of a domestic bank and the methodological changes in the recording of fees in 2013, exchange rate differences and write-offs and price adjustments.  
Sources: HANFA and CNB.

Figure 58 Year-on-year growth rates of domestic banks' external debt and loans by activity in the period from 30 September 2014 to 30 September 2015



Note: The structure of the change in debt by activity is shown only for the sector of private non-financial corporations, with the percentages on the x axis showing the share of export revenues in total revenues of the respective activity in 2014. Growth rates are not adjusted by the change in the external debt to capital ratio.  
Sources: FINA and CNB.

Figure 59 Comparable average prices of financing of non-financial corporate external and domestic debt (newly-granted loans)



Note: Only non-financial corporations indebted with domestic banks and abroad are included in the sample.  
Sources: HANFA and CNB.

banks (Figure 58) which have as of late opted for the relatively more profitable strategy of lending to the government (Figure 85, chapter Banking sector).

From the perspective of sub-sector indebtedness, the bulk of the decrease in the total debt of the non-financial corporate sector in the third quarter of 2015 (some 1% on an annual basis) is predominantly driven by the deleveraging of public enterprises paired with a parallel halt in the growth of private sector debt. The decline in public sector debt continued accelerating, its annual rate of reduction reaching some 11.9% at the end of September (Figures 56 and 57).

As for the private sector, debt growth is characteristic of activities with a higher share in export revenues, while trade and construction activities have been reducing their debt, predominantly to domestic but also to foreign banks. High annual growth rates of external debt observed in the transportation, storage and communication activities were the consequence of new borrowings by airports and seaports, and mobile operators, while in the manufacturing sector they were caused by pharmaceutical and shipbuilding companies, and companies whose activity is the dressing of leather.

Public sector non-financial corporations have been deleveraging to both domestic and external sources of funding (Figure 58). The most significant decline in external debt of these companies was observed in the oil production industry (refinancing from domestic sources) and public sector shipyards. It should also be noted that over 90% of the total decrease in the external debt of public enterprises was accounted for by just a small number of enterprises from the sector, including the aforementioned refinancing from domestic sources. The increase in the external debt of public enterprises in the energy sector, which was a consequence of the monthly coupon (yield) calculation on the corporate bond issue by HEP and was refinanced in October by a new USD corporate bond issue<sup>13</sup>, partly softened the mentioned decrease in the external debt of public enterprises. The decrease in the domestic debt of public enterprises from the energy sector and the transportation, storage and communications sectors was sizeable, with this decrease as in the case of external debt being concentrated to several larger exposures.

The preliminary analysis of the average unweighted price of financing for the group of non-financial corporations borrowing both from domestic banks and abroad clearly indicates that the price of foreign funding remains more favourable (Figure 59). In this context, the price of short-term foreign funding relative to long-term foreign funding is more favourable than the average interest rate on newly granted loans of domestic banks. The difference between interest rates on domestic and foreign

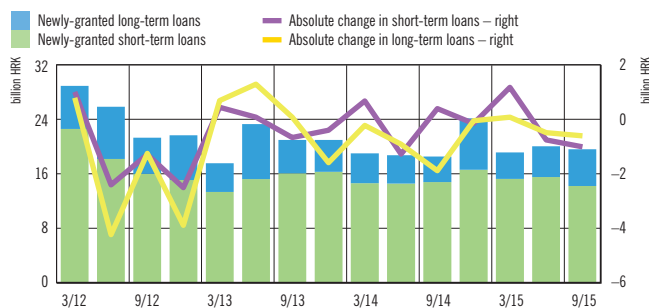
<sup>13</sup> Dollar-denominated liabilities were subsequently turned into euro-denominated liabilities using a cross currency swap, thus additionally reducing exposure to currency risk. The impact of the new corporate bond issue is not included in the graphic presentation of the annual growth rate of external debt because the transaction was realised in October 2015.

**Figure 60 Change in credit standards and demand for loans to corporates**



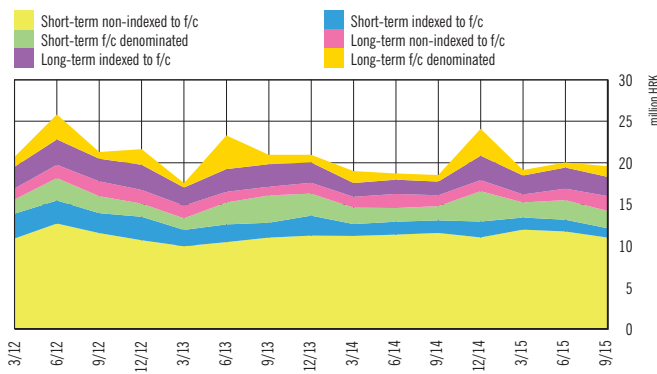
Note: Positive values show the increase in demand, i.e. the tightening of credit standards, whereas negative values show the decrease in demand, i.e. the easing of standards.  
Source: CNB.

**Figure 61 Newly-granted bank loans and absolute change in the stock of gross loans**



Note: Due to a change in the methodology of monitoring of stock and maturity of loans which are the consequence of change in the classification of sectors, the data from 31 December 2011 onwards are revised in line with the new methodology. The decrease in the stock of loans in December 2012 and 2013 is the result of the sale of a portion of claims of a major bank to a company in the direct ownership of the parent bank, with the decrease in June 2012 being the result of the assumption of a portion of shipyard debt by the government.  
Source: CNB.

**Figure 62 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.

loans for this group of enterprises has averaged at nearly 4% for newly granted short-term loans, while for long-term loans it totalled 2.5% on average. The possible reasons behind the lower price of foreign funding are that to the greatest extent companies in question are foreign-owned subsidiaries (which makes the price dependent on group relations) as well as different instruments (for example, short-term borrowing with domestic banks is based on commonly more expensive credit lines and credit card loans).

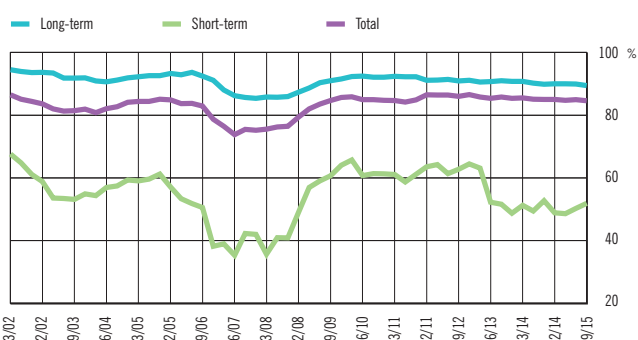
The results of the bank lending survey in the second and third quarter 2015 point to more intensive loan demand by enterprises and a slight tightening of lending terms at the end of the period pertaining to almost all corporate segments and loan categories (Figure 60). Favourable changes in lending standards observed since the end of 2014 were briefly interrupted in the third quarter of 2015, exclusively as a result of the tightening of standards by two largest domestic banks. These developments in loan supply characteristics at the end of the period were mostly spurred by slightly increased expenses linked to banks' capital position and enhanced risk perception regarding collateral, paired with the parallel favourable influence of bank liquidity. Demand for corporate loans had also spiked over the last two quarters of the year, especially in the segment of small and medium enterprises. The major drivers behind the increase in supply were the need to finance fixed capital formation and debt restructuring, while the decrease in the need to finance activities related to mergers, acquisitions and corporate restructuring worked in the opposite direction. All this is visible also in the slight growth of newly granted loans by domestic banks (Figure 61).

Despite the slight growth in lending to non-financial corporations over the second and the third quarter of 2015, their debt to domestic banks decreased (Figure 61). The slight growth in newly granted loans of domestic banks in the last two quarters of the year from the beginning of the same year was marked by an increase in long-term financing (irrespective of the currency) and concurrent reduction in short-term financing. This was most probably caused by the growth in business optimism in 2015 (which spurred demand for long-term loans) and the good corporate financial performance in 2014 mentioned earlier (which decreased the need for short-term borrowing).

The share of kuna in total newly granted loans went up from 5% to 9% (for long-term loans) and went down from 62% to 56% (for short-term loans) in the period from the first to the third quarter of 2015. In these conditions, the currency and maturity structure of newly granted loans stayed almost unchanged (Figure 62).

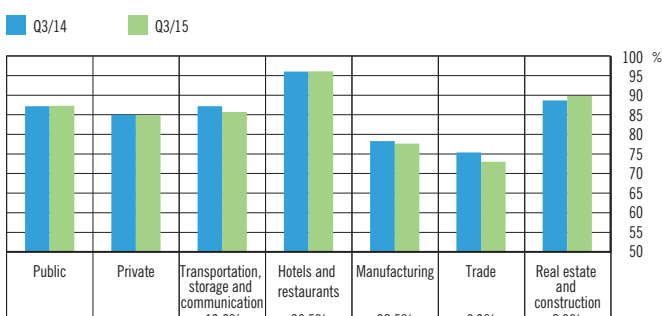
Amid the more intensive corporate deleveraging with domestic banks in foreign currency vis-a-vis the increase in their foreign funding, the overall exposure of the non-financial corporate sector to currency risk went down slightly but remained high (Figure 63). The process of deleveraging contributed to the fact that the share of foreign currency debt of private and public sector non-financial corporations in total loans of the sector

Figure 63 Share of corporate non-kuna debt<sup>a</sup> in total loans, by maturity



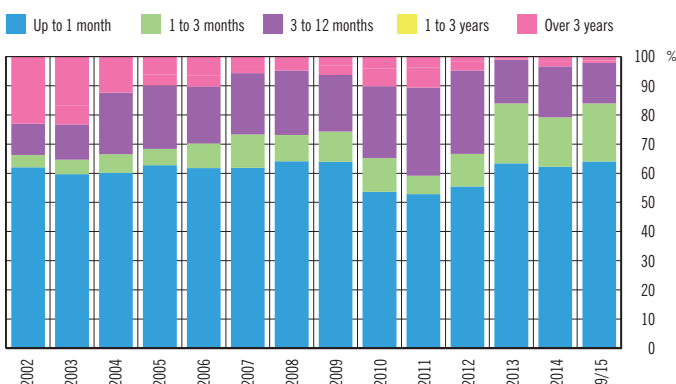
<sup>a</sup> It is assumed that total external debt is denominated in foreign currencies. Debt indexed to foreign currencies (a foreign currency clause) is also included.  
Source: CNB.

Figure 64 Share of corporate non-kuna debt<sup>a</sup> in total loans, by sub-sector and activity



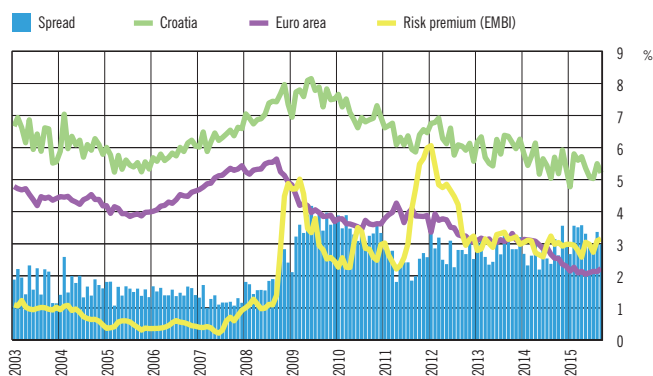
Note: 1. The percentages on the x axis show the share of export revenues in total revenues of the respective activity in 2014. 2. It is assumed that total external debt is denominated in foreign currencies. 3. Debt indexed to foreign currencies (a foreign currency clause) is also included.  
Sources: FINA and CNB.

Figure 65 Breakdown of bank loans to non-financial corporations by interest rate variability



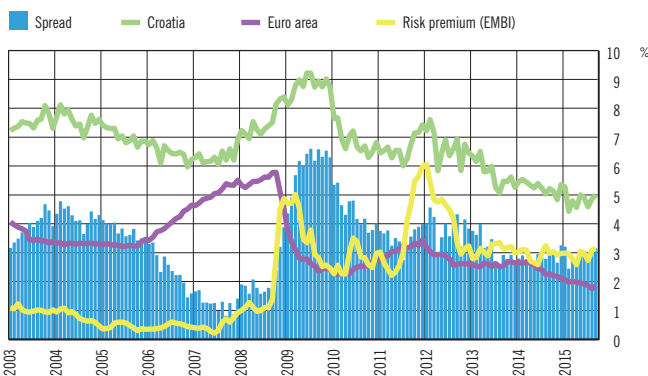
Source: CNB.

Figure 66 Interest rates on long-term loans to non-financial corporations in Croatia and the euro area



Sources: ECB, Bloomberg and CNB.

Figure 67 Interest rates on short-term loans to non-financial corporations in Croatia and the euro area



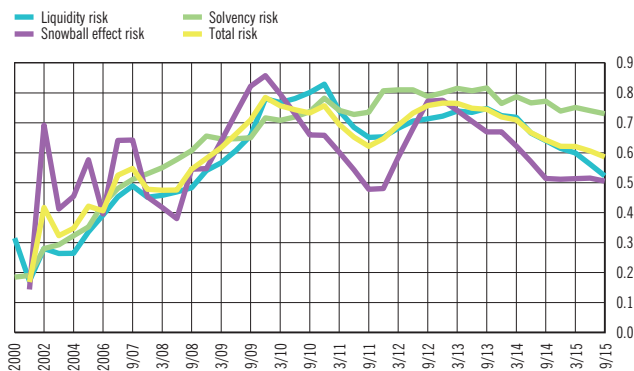
Sources: ECB, Bloomberg and CNB.

remained unchanged in the last year, that is, in the period from September 2014 to September 2015. However, in contrast to private enterprises public enterprises reduced their currency exposure both with domestic and foreign creditors, thus lowering their currency risk. Broken down by activity, the greatest contribution to the slight decrease in the currency exposure of the sector came from enterprises dealing in trade, because 85% of the decrease in their total debt was related to debt denominated in foreign currency. As for enterprises dealing in other activities, exposure to currency risk remained mostly unchanged (Figure 64).

Corporate exposure to interest rate risk in the first nine months of 2015 increased slightly from the end of the last year, thus additionally underlining the possibility of its materialisation in the event of interest rate growth. In particular, the structure of loans by interest rate variability shows an increase in the share of loans with an interest rate variable within 3 months, which offset the decrease in the share of loans in which interest rates



Figure 68 Indicators of vulnerability in the non-financial corporate sector



Note: The vulnerability in the non-financial corporate sector was estimated by three indicators. The liquidity risk indicator was calculated as the ratio of the sum of the total debt amount and interest payments of the sector to gross operating profit, i.e. EBITDA:

$$LR_t = 0.5 \cdot \frac{Debt_t}{EBITDA_t} + 0.5 \cdot \frac{Interest\ payments_t}{EBITDA_t}$$

The solvency indicator was calculated as the debt-to-equity ratio:

$$SR_t = \frac{Debt_t}{Equity_t}$$

The snowball effect risk was calculated as the ratio of interest payments to the average debt adjusted by the growth in gross operating profit, i.e. EBITDA:

$$SNR_t = \frac{Interest\ payments_t}{\frac{Debt_t + Debt_{t-1} + Debt_{t-2} + Debt_{t-3}}{4}} - \left( \frac{EBITDA_t}{EBITDA_{t-4}} - 1 \right)$$

These indicators were normalised to the value range 0 – 1 and the total risk was calculated as the average of the three mentioned normalised indicators:

$$TR_t = \frac{LR'_t + SR'_t + SNR'_t}{3}$$

The methodology is slightly changed compared to the previous issue due to the implementation of the EBITDA (instead of the gross operating surplus) of corporations interpolated to the quarterly dynamics in line with the developments in the quarterly nominal GDP.

Sources: FINA and CNB.

can change in the period from 3 to 12 months (Figure 65). Parallel with this, the share of loans with an interest rate variable over 12 months went down and thus contributed to the slight increase in the share of loans with an interest rate variable within one year to a high 98% (from 97% late last year).

The interest rates of domestic banks levelled off in the first nine months of 2015 thus maintaining their historically low levels. This was also true for prices of short- and long-term corporate financing which ranged within their usual fluctuation band around the level of some 5%. The slight growth of yield to maturity on long-term Croatian government bonds was probably one of the factors limiting the room for further reduction in the price of long-term corporate financing. Parallel with such movements of interest rates in Croatia, their downward trend continued in the euro area in relation to short-term corporate financing, while long-term interest rates held at the levels attained at the beginning of the year. In such conditions, the spread between interest rates on corporate loans in Croatia and the euro area stagnated (on long-term loans), i.e. increased slightly (on short-term loans), reflecting the still relatively high country risk premium (Figures 66 and 67).

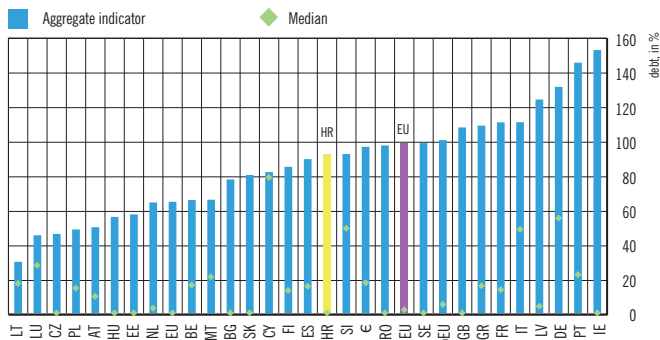
Indicators of vulnerability of the non-financial corporate sector showed a decline in the solvency risk and liquidity risk indicators, which was under the positive influence of good corporate financial performance in 2014, when earnings (EBITDA) and equity increased, more of the same being expected in 2015. The snowball effect risk went down negligibly (based on the estimated future growth of EBITDA being the same as in 2014), while the total risk of the non-financial corporate sector started declining thanks to lower liquidity and solvency risks (Figure 68). The downsizing of the non-financial corporate sector debt and increase in EBITDA contributed to the reduction in liquidity risk, while the parallel reduction in solvency risk was under the positive influence of the already mentioned decrease in debt and the increase in capital from retained earnings in 2014. It can be concluded that a portion of retained profit is transferred to capital and reserves required for future investment projects, while the remaining portion is used to decrease the liabilities to funding sources and to finance working capital.

## Analytical review: Corporate debt in Croatia and the EU

A comparison of debt indicators for non-financial corporations in the EU in 2014 (Figure 68) showed that Croatian non-financial corporations are positioned in the middle of the EU distribution but above the average for new European Union member states. The debt of new EU member states is lower than that of old EU member states, which is a consequence of taking into account the risk of the home country of the non-financial corporation, of less developed financial intermediaries and markets and the consequently unfavourable and tighter borrowing terms.

Measured by a profitability indicator, the EBITDA margin, Croatian enterprises are to be found in the top section of the profitability distribution, while high costs of depreciation and amortization placed them at the lower end of the distribution measured by the EBIT margin (Figure 70 and 71). High costs of depreciation and amortization are a consequence of the high share of tangible assets in total corporate assets viewed at an aggregate level, rather than of a much different asset depreciation policy. Namely, the average rate of depreciation and amortisation, calculated from aggregated data, is equal to that in new EU member states and slightly lower than the EU average. A large share of tangible assets in total assets is a result of a preference, for historical and cultural reasons, for the acquisition of tangible assets (real property and equipment), and of the economy being oriented towards tourism (some 9% of tangible assets are accounted for by tourism; only Malta boasts a higher share, while the EU average is 2.4%) and because of the underdeveloped lease and leasing markets. In the old EU member states these markets and available instruments and options are more developed and more accessible, so balance sheets of non-financial corporations are not burdened by tangible assets,

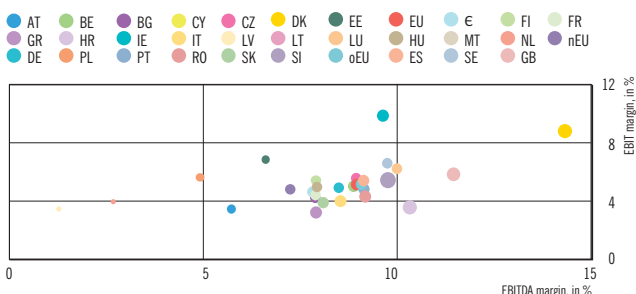
Figure 69 Comparison of debt among EU-28 countries



Note: Debt is shown as total liabilities to capital ratio. New EUROPA (nEU) refers to the countries that joined the EU after 2004, while old EUROPA (oEU) refers to the countries that joined the EU before 2004. Symbol € denotes the euro area countries.  
Source: BvDAmadeus database.

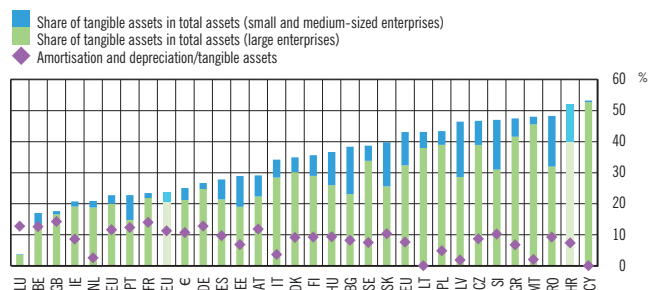
which provides them with greater flexibility as regards their expansion or contraction, mobility and directing sources of financing towards their business activities (core business) instead into tangible assets which usually do not produce direct income (depending on the business activity). In addition, a considerable burden of tangible assets is borne by the construction activity, since construction companies have some 38% of total tangible assets of non-financial corporates in Croatia on their balance sheets (only Sweden recorded a higher figure), which can be attributed to the business climate and market conditions in Croatia, where buildings under construction and unsold flats remain in the balance sheets of construction companies. This higher share of tangible assets is not necessarily linked to the stock of unsold flats but rather to the actual economic activity of this sector. Namely, in 2007 the share of tangible assets of the construction sector was 40.3%, while late in 2014 it stood at 38.6% in accordance with the decline in activity. On average, in the EU-28, tangible assets of companies from the construction sector made up some 15% of total tangible assets of the non-financial corporate sector in 2014 (data from the BvDAmadeus database).

Figure 70 Aggregate indicators by EU-28 countries



Note: EBITDA margin is calculated as the share of EBITDA (profit before interest payments, tax, depreciation and amortisation) in total operating income, and EBIT margin is calculated as the share of EBIT (profit before interest payments and tax) in total operating income. The size of the circle denotes the activity of non-financial corporations calculated as the ratio of total operating income to capital and long-term liabilities. New EUROPA (nEU) refers to the countries that joined the EU after 2004, while old EUROPA (oEU) refers to the countries that joined the EU before 2004. Symbol € denotes the euro area countries.  
Source: BvDAmadeus database.

Figure 71 Share of tangible assets in total assets and the average rate of amortisation and depreciation of tangible assets among EU-28 countries



Note: In line with the EU definition, the segment of large enterprises has to meet one of the following conditions: operating income above EUR 10m, total assets above EUR 20m and more than 150 employees. New EUROPA (nEU) refers to the countries that joined the EU after 2004, while old EUROPA (oEU) refers to the countries that joined the EU before 2004. Symbol € denotes the euro area countries.  
Source: BvDAmadeus database.

## Box 4 Cost of bank capital

In order to understand the business decisions and the strategy of an individual company and draw conclusions as to its performance from the owner's perspective, one needs to understand the cost of capital, i.e. the minimum acceptable threshold of the return on a project, which distinguishes projects that increase the value of the company from those that reduce it.

The cost of capital (liabilities and equity) of each company is the rate at which it acquired funds necessary to finance its business. Given that the majority of companies are financed from a certain combination of equity and debt sources of finance, the cost of capital comprises the cost of debt and equity weighted by their share in the liabilities (Figure 1). Although banks are corporations, in the sense that the main task of their managers is to increase their owners' investments and therefore the concepts of corporate finance apply, certain specifics make the issue of the cost of capital characteristic for banks. These characteristics are primarily reflected in the fact that most obligations in bank liabilities are made up of short-term private sector deposits that cannot be considered long-term sources of funding so their price is not reflected in the price of bank long term borrowing. In addition, the deposit insurance scheme reduces the cost of acquisition of these types of banks' liabilities and therefore this cost no longer reflects the risk profile of the bank in question. Consequently, it makes sense to view the cost of bank capital through the prism of owner's equity.

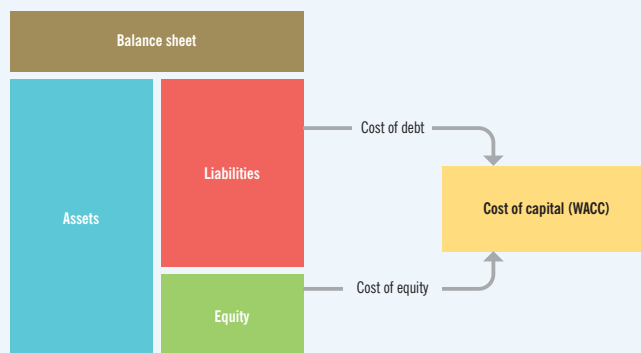
From the financial stability point of view, studying the cost of bank equity is important because it contributes to the understanding of the relationship between banks and their owners and thus improves the analysis of their business decision making and provides an insight into the owner's perception of the bank's risk, which might be a useful analytical tool in the process of analysing the strategy and financial position of bank owners. In addition, depending on the market strength of each entity, that is on the demand for products, the cost of equity affects the end price of the product supplied by a given enterprise, which in the case of a credit institution means that it contributes to the decrease or increase in interest rates for the end user, which later on may affect borrowing (deleveraging) trends of individual sectors. Namely, in the circumstances of reduced demand for loans a substantial rise in the cost of banking sector equity might contribute to the increase in the cost of debt for other sectors and spur bank deleveraging.

### Cost of equity calculation methodology

The cost of equity has been estimated on a sample of 200 banks operating in Europe whose shares are actively traded on a monthly level, the sample including 10 banks operating in Croatia and accounting for 51.3% of the total assets of the Croatian banking system. The calculation was made using the theoretical capital asset pricing model (CAPM) modified to be applied for the analysis of trends observed in the European banking system over the last 11 years. The cost of equity is estimated as follows:

$$COE = RF + \beta \cdot (IMRP - RF) + CRP,$$

Figure 1 Structural presentation of the concept of capital cost



Source: CNB.

where  $RF$  is the risk-free rate of return in the European market estimated via the yield to maturity on the ten-year German bond,  $IMRP$  the implicit risk premium of the risk assets market<sup>1</sup>, denoting the risk premium required by investors for investments with average risk level,  $\beta$  is the susceptibility of the shares (beta) of the observed credit institution to the developments in the market portfolio, estimated by the regression analysis of the movements of their monthly returns in a five-year sample and where  $CRP$  is the country risk premium estimated by means of the CDS of the country in which the observed credit institution operates.

### Risk perception regarding the operation of European banks

Risk premium distribution of European banks, defined as the difference between cost of equity, that is, the expected return on invested capital, and the risk-free rate clearly shows the developments in the risk perception of the operation of banks operating in Europe (Figure 2). Two significant spikes in the premium were observed in the period under review amid the growth of uncertainty in the capital markets: the first early in 2009 under the influence of the growth in aversion to investor risk after the outbreak of the financial crisis and the second late in 2011 after the onset of the debt crisis initiated by the restructuring of public debt and the consequent fall in the credit ratings of some euro area countries which weakened the trust in the euro. The mentioned spike late in 2011 clearly illustrates the connection between the risks of countries and banks operating in them. Namely, investor concern about a country's creditworthiness spilled over to its creditors – the banks. The possible failing of large banks had a negative effect on the perception of stability of state finances due to the possible cost of bank bail-outs.

The bank risk premium in Europe has trended downward uninterruptedly since 2011. This may be linked to actions taken by the European Central Bank that were directed at increasing the availability of funds in financial markets and the weakening of the negative feedback between the country risk and bank risk by initiating a bank union within

<sup>1</sup> Based on expected future cash flows it is possible to estimate the market risk premium from the current value of the market portfolio of risk assets. For the purposes of this analysis it was assumed that the composite index STOXX 600 Europe replicates the market portfolio of risk assets.



Figure 2 Developments in distribution of risk premia of European banks

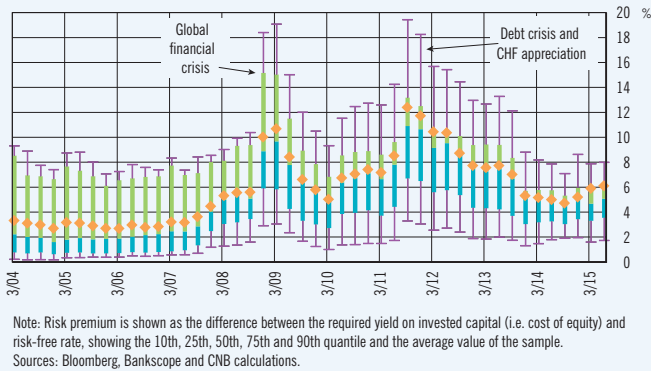


Figure 3 Components of cost of equity for banks in the euro area

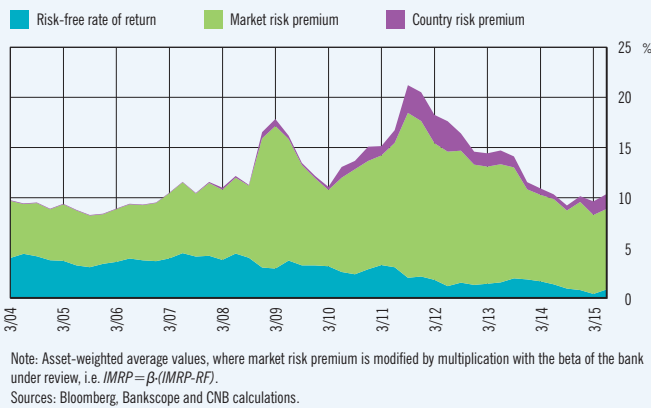


Figure 4 Components of cost of equity for banks in Croatia

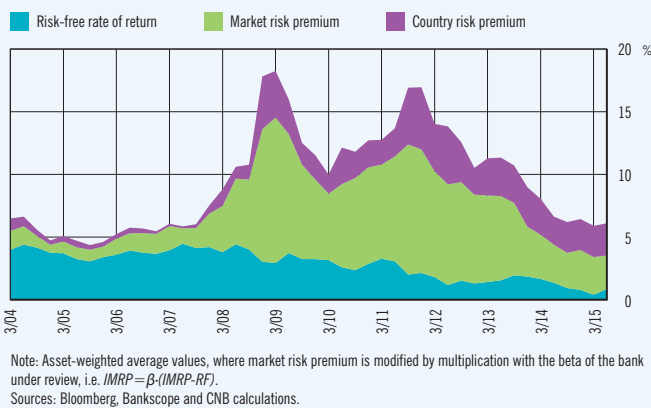
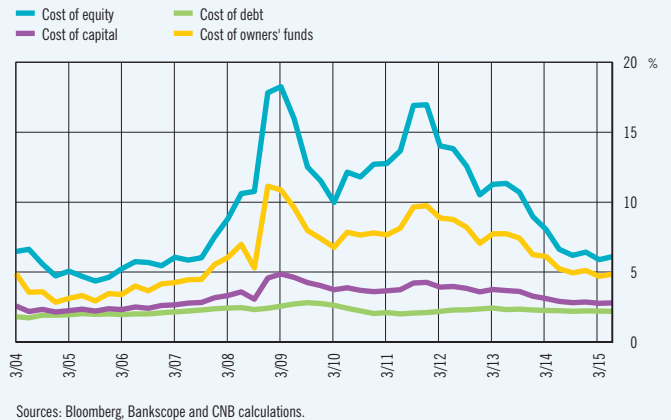


Figure 5 Overview of costs of acquiring individual sources of funding



the euro area. This trend went on until 2015 when the risk premium started growing, which can be attributed to uncertainties arising from the Ukrainian and the Greek crisis, as well as to the generally increased level of uncertainty in global financial markets in the period.

Despite the ECB's measures contributing towards reducing the cost of capital in the entire market, the cost of owner's equity of banks operating in the euro area countries continues to be higher than in the period before 2008 primarily due to the high market risk premium, i.e. the still present heightened caution by investors when investing in shares of banks operating in the countries of the euro area (Figure 3). The Basel III initiative applied in the EU primarily through the Capital Requirements Directives (CRD IV) and Capital Requirements Regulation (CRR) strengthened the regulatory requirements on capital quantity and quality. These requirements lower the cost of bank debt due to the reduction in their risk perception. At the same time, however, they lead to the increase in the share of equity in liabilities which represents a more expensive source of financing. Therefore it is currently hard to determine the end effect of the said requirements on the cost of bank capital in Europe.

#### The cost of bank equity in Croatia and the standing of bank owners

As in other parts of Europe, in Croatia banks experienced a substantial rise in the cost of equity on two occasions, late in 2008 and late in 2011. After 2011, the cost of bank equity in Croatia started declining uninterruptedly to some 6.1% at the end of June 2015, its pre-crisis level (Figure 4).

A review of the components of the cost of equity shows that both the level and the dynamics of the cost of equity in the period up to 2008 were for the most part determined by the developments in the risk-free rate, which had been declining uninterruptedly after 2008 to reach its historical low of 0.4% early in 2015. In the period after the outbreak of the financial crisis the cost of equity was predominantly determined by the movement of the market risk premium as a measure of uncertainty in the market and investor caution when investing in the banking sector. The market risk premium increased substantially after 2008, maintaining is high level until mid-2013, when it went down significantly which

can be attributed to Croatia's EU accession. Consequently, the cost of equity for banks in Croatia decreased to some 6% and is equally affected by the level of the market risk premium and the level of country risk premium.

A fact specific for the analysis of Croatian banks is that owners, in addition to the owner's equity, invested their funds in loans and deposits, which, given they come from owners, cannot be fully considered as liabilities. Therefore, when calculating the cost of owners' equity this source of funds should also be taken into consideration. Assuming that the cost of owners' debt is equal to the implicit deposit interest rate of an individual bank, it is possible to estimate the cost of owners' funds by applying the appropriate weights in debt and equity holdings by which majority owners participate in bank liabilities. Consequently, the cost of owners' funds totalled some 4% in June 2015 (Figure 5).

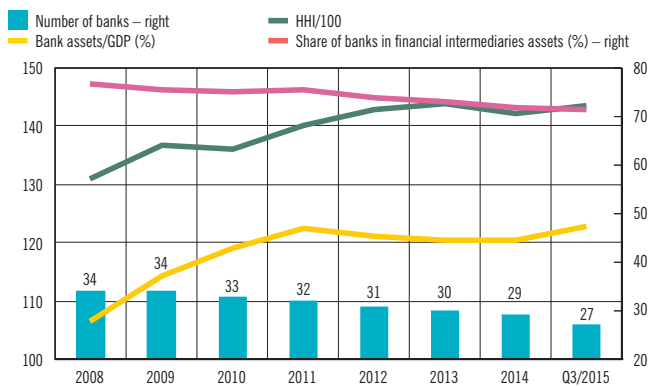
### Conclusion

Monetary policy measures undertaken by the European Central Bank in the period after 2018 were directed at increasing access to funds and ensuring liquidity in the European capital markets, pushing down the risk-free rate of return and consequently the cost of equity of European banks. However, tightened regulatory standards and capital requirements under the influence of the Basel III initiative and CRD IV and CRR increased the cost of equity and thus "pushed up" the price of capital for owners, possibly creating unwanted incentives for banks to assume

more risk in order to achieve satisfactory returns on invested capital that would increase the value of the bank as an investment. In addition, the increased cost of equity might raise the price of bank products or even cause some banks to leave the market, which could, in both cases, result in the strengthening of the role of shadow banking in the European financial sector (for more details see Box 2 Shadow banking in Croatia). Although the cost of equity of banks in Croatia is not high compared to other European countries, the position of their owners is unfavourable for other reasons that contribute to relatively lower bank profitability in Croatia. Namely, the combination of substantial credit risk materialisation in Croatia and high share of capital in bank balance sheets, resulting from the active employment of macroprudential measures by the CNB before the crisis, represents a significant burden for the profitability of bank equity in Croatia. Earnings are depressed by poor economic and credit growth and constant changes in lending structure, with the share of government sector continuing its growth in banks' balance sheets (Figure 75, chapter Banking sector), which leads to the strengthening of transmission channels of interaction between the sovereign risk and the banking system risk whereby an unwanted event might lead to a negative bank-sovereign risk feedback loop with substantial negative consequences on the banking system and the economy as a whole. The analysis also indicates that the lowering of the sovereign risk might be directly transposed into lower cost of bank equity, thus leading to the decrease in bank lending rates and ultimately enabling more favourable financing of the real sector.

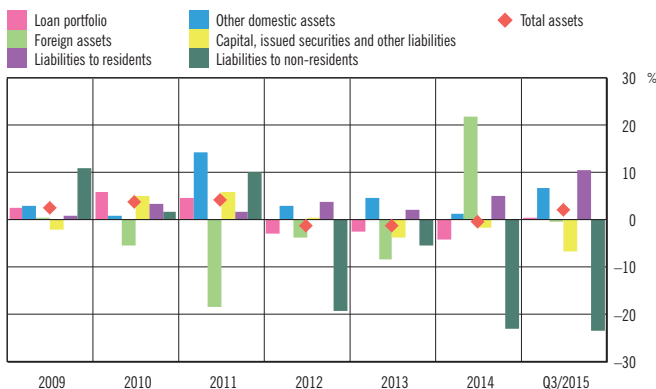
# Banking sector

Figure 72 Selected developments in the banking sector



Source: CNB.

Figure 73 Year-on-year growth in major banking sector balance sheet items



Source: CNB.

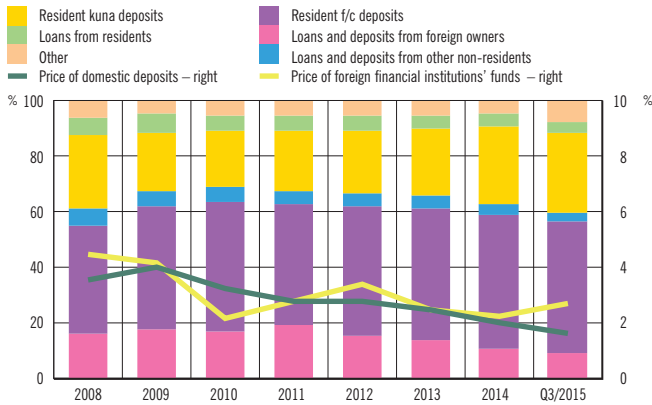
The cost of conversion of loans indexed to the Swiss franc into euros considerably burdened the banking sector and caused a fall in the capitalisation of the sector due to the losses sustained. On the other hand, the stabilisation of the share of non-performing loans and the parallel continuation of the growth in their coverage, as well as activities aimed at improving banks' balance sheets, have positively contributed to the stability of this sector. Banks liabilities towards their owners continued to decline due to the ongoing deleveraging of the domestic private sector. In addition, bank capital is under pressure due to sustained losses and increased dividend payments.

## Balance sheet vulnerabilities

The annual growth in bank assets of 1.9% in the third quarter 2015 is a result of the seasonal increase in deposits and the one-off transaction in the corporate segment<sup>14</sup>, the exclusion of which would reduce the annual asset growth rate to 0.9%. Bank balance sheet structure, however, registered unfavourable developments so the standard pressure arising from the diminished risk appetite and the volume of non-performing loans was accompanied by the loss sustained from the costs for the conversion of loans in Swiss francs, in a total amount almost equal to the three-year expected bank profit, and the consequent fall in the capitalisation of the sector. At the same

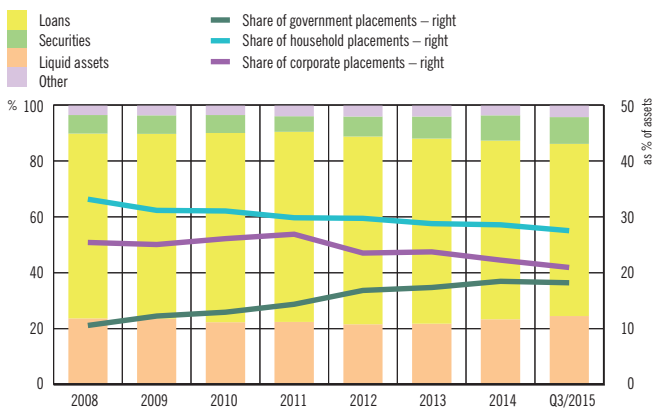
<sup>14</sup> The sale of its tobacco segment by Adris, which has thus far yielded the banking sector some HRK 3.9bn in the increase of corporate transaction deposits.

Figure 74 Structure and price of banking sector liabilities



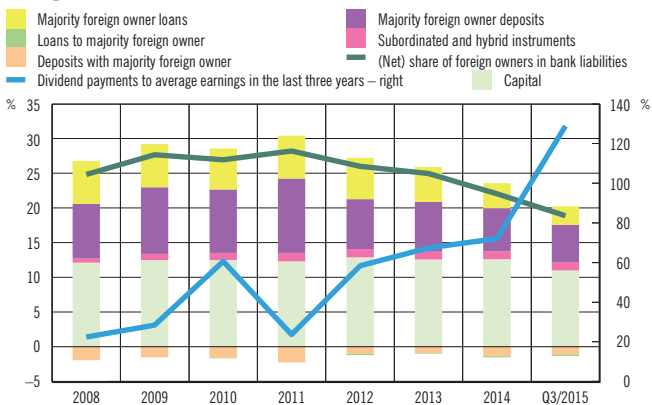
Source: CNB.

Figure 75 Banking sector assets



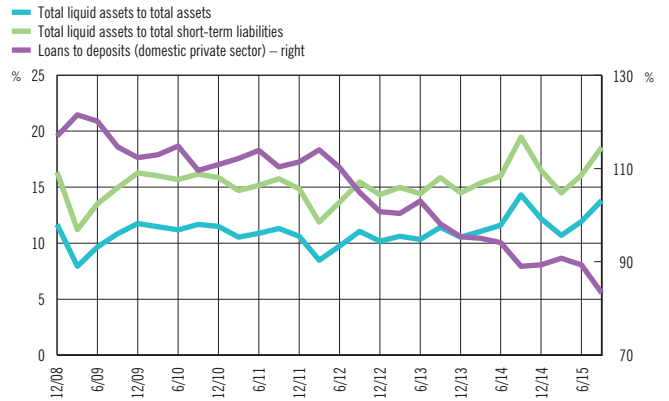
Source: CNB.

Figure 76 Net financial position of banks with respect to foreign owners



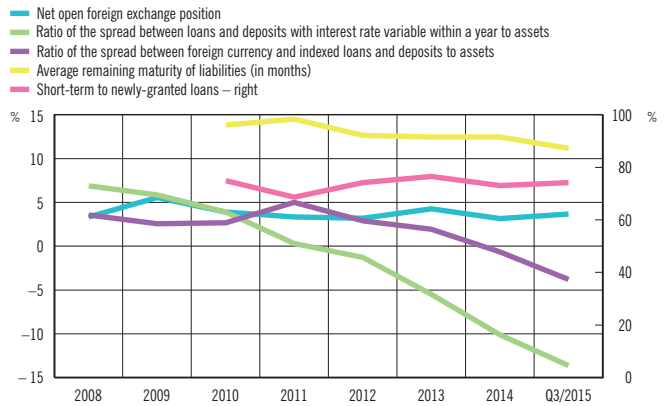
Source: CNB.

Figure 77 Liquidity indicators



Source: CNB.

Figure 78 Bank exposure to direct risks



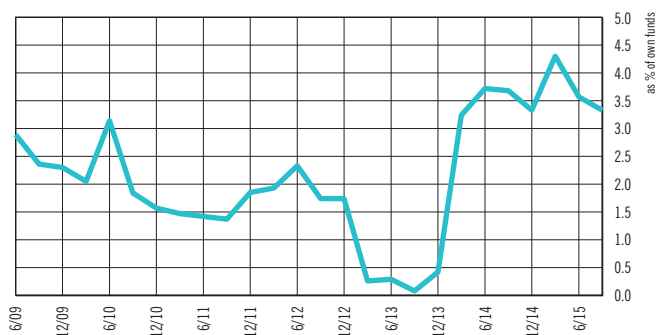
Source: CNB.

time, market consolidation continued, as did the increase in its concentration (Figure 72).

In the period of absence of private sector lending growth, banks mostly use the generated funds for government financing and deleveraging abroad, temporarily also investing their funds with other financial institutions (Figure 73). Despite the good tourist season, the annual growth of household deposits slowed down, totalling 1.9%, equalling deposit interest rates; this may be attributed to low nominal deposit rates, which caused an increase in the share of transaction deposits (Figures 2 and 3 of Box 3). Such developments expose banks to refinancing risk and risk of liquidity outflows given the fact that the share of transaction deposits exceeded one fourth of the deposits of the domestic private sector at the end of September 2015, thus also reducing the average remaining maturity of bank liabilities.

Loans to the domestic private sector continued on their downward path at the end of September on an annual level (loans

Figure 79 Interest rate risk



Source: CNB.

to the corporate sector decreasing by 1.5% and to the household sector by 0.6%). However, due to the growth in loans to government units (16.0%), total loans went up by 1.2% on an annual level. Continued lending to the government, as well as investments in the sector via the purchase of securities pushed the share of placements to the government further up to 18.2% of assets<sup>15</sup> at the end of the month. In addition to the rise in concentration risk, the increase in the share of government securities exposes banks to risks of changes in the prices of fixed-yield instruments. Accordingly, banks are exposed to losses arising from a possible decline in the value of their portfolio of debt securities resulting from a growth in the country risk premium; this comes particularly to the fore if it is taken into account that over 80% of government securities are held in portfolios traded at market values (Figure 75, Macroeconomic environment section, Stress testing of credit institutions).

Amid declining loans to the private sector and a stable inflow of deposits, banks continued deleveraging with respect to their foreign owners. As a result, the (net) share of foreign owners in bank liabilities went down in the first nine months of 2015, from 20.9% to 18.9% (or some 2 percentage points). However, a substantial impact on the decline in capital was produced by the conversion of loans in Swiss francs. The conversion excluded, the share of foreign owners would amount to 19.3%, which would represent a slowdown in the trend of deleveraging against them. A decrease in the share of foreign owners in bank liabilities continues to run concurrently with the reduction in their obligations. However, after 2012 the ratio of dividend payments and three-year average realised earnings has started growing (Figure 76).

The modest economic recovery has thus far failed to spur credit growth and its expected continuation does not necessarily have to spill over to credit growth. Therefore, the majority of changes in bank balance sheets in the upcoming period will be related

<sup>15</sup> Government exposures shown here include loans, bonds and T-bills but not off-balance sheet items.

Figure 80 Share of unhedged loans in total loans exposed to CICR



Source: CNB.

to their structure, that is, to banks trying to optimise costs. The poor business outlook of banks should be viewed from the owners' perspective, that is, from the aspect of capital management at the level of international financial groups. Sustained losses, legal uncertainty caused by frequent changes to relevant regulations, the poor outlook and relatively high average price of liabilities despite the low cost of capital (Box 4, Figure 5) are likely together to bring about a further reduction of exposures by owners in the Croatian market. The increase over the last few years in dividend payments that have largely exceeded the realised earnings and make up a channel for decreasing exposure in Croatia should thus be viewed in this context.

The spillover of deposit growth to deposits with financial institutions led to an increase in liquidity indicators (Figure 77). In addition, the continuation of the long-term trend of growing deposits and declining loans caused the ratio between loans and deposits for the domestic financial sector to continue decreasing. As a rule, a lower loans to deposits ratio reflects the fact that loans are being financed by more stable sources. However, in Croatia at the moment it indicates above all a decline in private sector loans. Significant fiscal consolidation and the declining need for new net borrowing might also serve as an impetus for finding a new business model with stronger lending to the private sector.

The absence of credit growth is incentivising banks to reduce those risks on which they can to some extent have an influence. The slight growth in the net open foreign exchange position can thus be explained by banks preparing for the process of converting loans in Swiss francs. The decline in the average remaining maturity of bank liabilities is a result of the increase in the share of transaction deposits in bank deposits. Finally, interest risk decreased slightly from 2014. However, a more substantial lowering of this risk may be expected with the process of conversion of housing loans in Swiss francs (with fixed interest rates) into loans in euros (with a variable interest rate) (Figure 78 and 79).

Bank exposure to CICR declined as a result of the fall in the share of loans unhedged against the CICR in total loans (Figure 80). However, the decrease in this risk is a result of the rise in other indirect risk. Namely, the fall in the exposure to CICR is largely a result of the increase in the share of short-term (most often kuna) loans in newly granted loans, which increases the refinancing risk for clients and thus in turn the credit risk for banks.

### Strategic risks<sup>16</sup>

The dynamics of a bank’s performance continues to be determined largely by the credit portfolio, which is to the greatest extent impacted by the conversion of loans in Swiss francs and to a smaller extent by the expected rise in the coverage of the existing non-performing loans (Figure 81). In addition to the mentioned conversion cost (currently at HRK 6.9bn<sup>17</sup>), the decline in income from loans in the Swiss franc in 2015 was also affected by the Consumer Credit Act, which fixed the interest rate of 3.23% for such loans from January 2014 onward (some HRK 400m in 2015), and also froze the kuna exchange rate against the Swiss franc to 6.39. (some HRK 220m). Consequently, the bank profitability indicators suffered substantially with ROAA standing at some -1.0% and ROAE reaching -8.0%, while net interest margin increased slightly.

Without the one-off conversion cost ROAA would increase to 0.67% and ROAE amount to 4.1% (Figures 81 and 82). In addition, it is noteworthy that in 2016 there will be no impact of the conversion cost or mentioned impact of the Consumer Credit Act related to the loans in the Swiss franc.

Banks managed to mitigate the fall in earnings through higher operating earnings, that is, the growth in the interest rate spread spurred by the decline in deposit rates. However, the slight rise in the interest spread and net interest margin in the period of loan stagnation could not neutralise the cost of conversion. These conclusions are confirmed by the decomposition of changes in the profitability of bank assets<sup>18</sup> (Figures 82, 83 and 84).

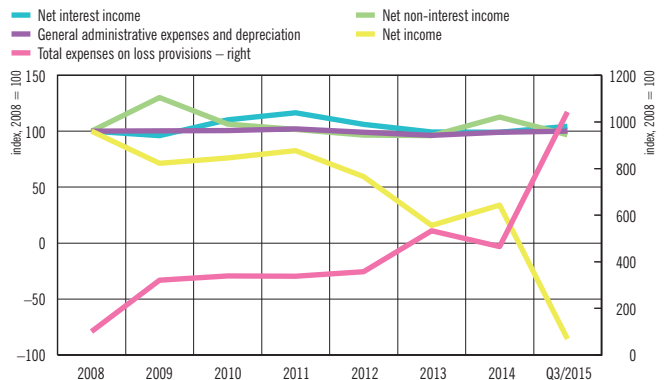
The growth of the public sector share in bank loan portfolio is a result of its relative profitability and demand by this sector for financing (Figure 85). After value adjustments the profitability

16 Income statement items up to September 2015 were annualised to be comparable with those for the preceding whole year periods. This was made by summing up banks’ business results in the last quarter of 2014 and the first three quarters of 2015.

17 The mentioned cost of conversion is estimated by banks given that it has been calculated shortly before the Act entered into effect but prior to individual conversion offer being sent.

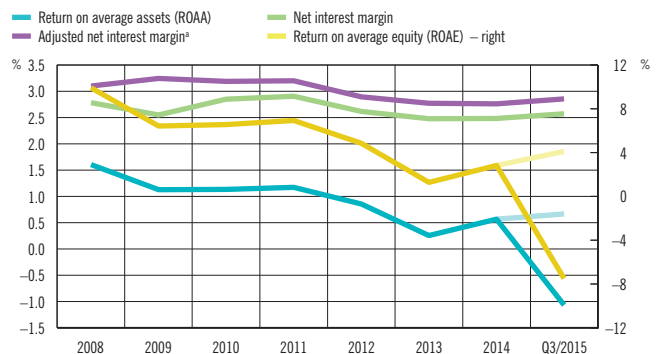
18 For more on the decomposition of changes in the profitability of bank assets see Box 4. New approach to the decomposition of return on bank assets, *Financial Stability*, No. 14.

Figure 81 Change in selected business performance indicators



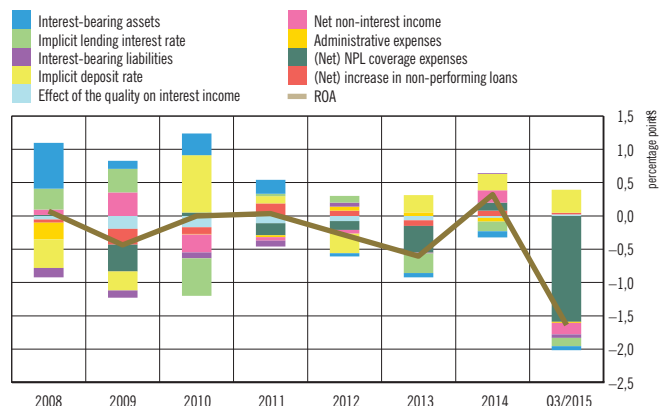
Source: CNB.

Figure 82 Indicators of returns



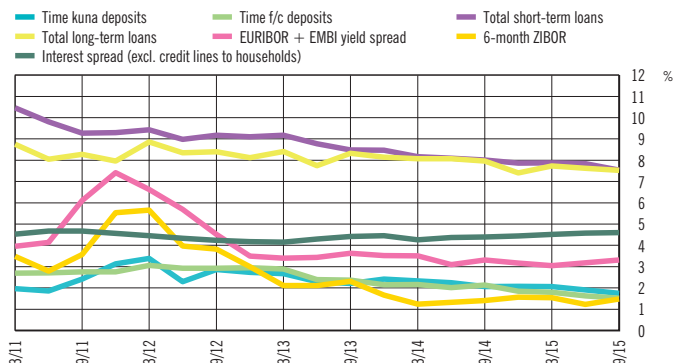
<sup>a</sup> Net interest income of banks is adjusted by income from trading activity and calculated exchange rate gains and losses. Note: The light blue and yellow series show the value excluding the effect of the conversion of CHF loans. Source: CNB.

Figure 83 Decomposition of the change in the return on assets



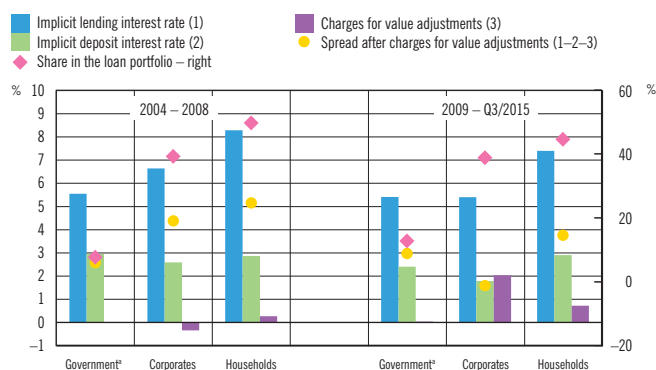
Source: CNB.

Figure 84 Selected interest rates (quarterly average of monthly interest rates)



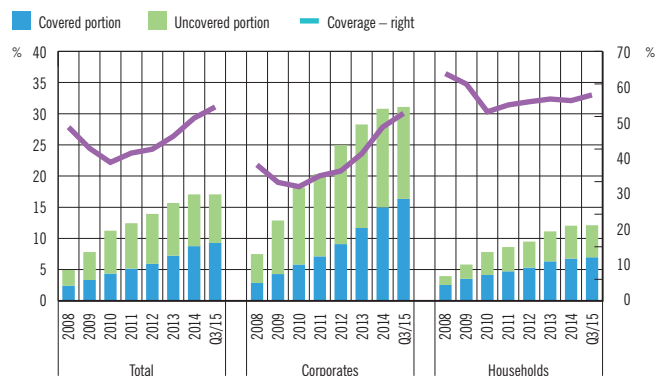
Note: Methodological break in bank interest rates series after January 2011.  
Source: CNB.

Figure 85 Change in bank profitability in various segments of financing in the period of crisis



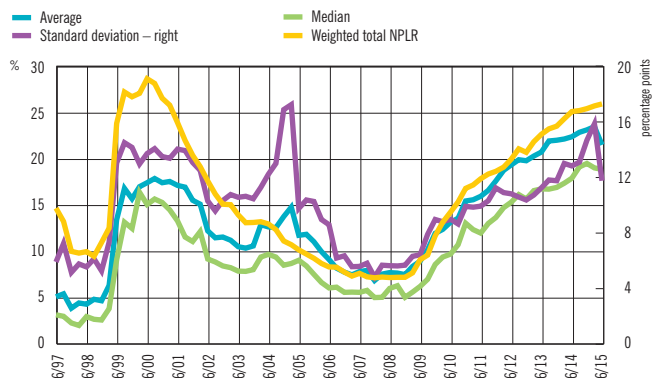
\* General and administrative expenses and depreciation are excluded.  
Source: CNB.

Figure 86 Non-performing to total loans ratio and its coverage by sectors



Source: CNB.

Figure 87 Distribution of the ratio of non-performing loans



Source: CNB.

of other sectors decreased substantially in relation to pre-crisis levels.

## Banks' credit risk

The rise in loans to the government, a slight recovery in the quality of non-housing loans to households and the stagnation of the quality of corporate loans, as well as the continued sale of bank placements pushed the share of non-performing loans down a notch, to 17.0% at the end of September. The quality of non-housing loans to households, the share of which in all loans reached 14.7% at the end of September, improved primarily due to the sale of the non-performing segment, while the quality of housing loans continued deteriorating gradually, the share of non-performing loans in this segment totalling 9.35% at the end of September. Consequently, the share of non-performing loans remained stable at 12.1% at the end of 2015. In the same period the quality of corporate loans declined negligibly, the share of non-performing loans in this sector rising to 31.1%. It is noteworthy that apart from the growth in the amount of non-performing loans the growth in their share is under the influence of the decline in total loans to corporates and households.

The coverage of non-performing loans continued to grow due to ageing of existing non-performing loans and the application of amended rules on loan classification (after 2013). The coverage of non-performing loans thus reached 54.4% at the end of September 2014, to the greatest extent under the influence of the continued growth in the coverage of non-performing loans to corporates, which reached 52.6%. In contrast, the coverage of non-performing loans to households levelled off at 57.5% (Figure 86). As a result, when compared internationally, Croatia boasts an above-average coverage of non-performing loans among the EU countries and average coverage when compared with CEE countries (Figure 91).



Figure 88 Developments in the distribution of the ratio of non-performing loans

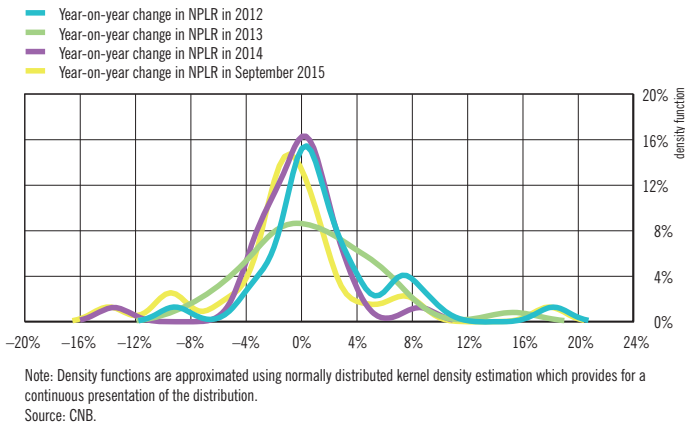


Figure 89 Resolution of the issue of non-performing loans in banks

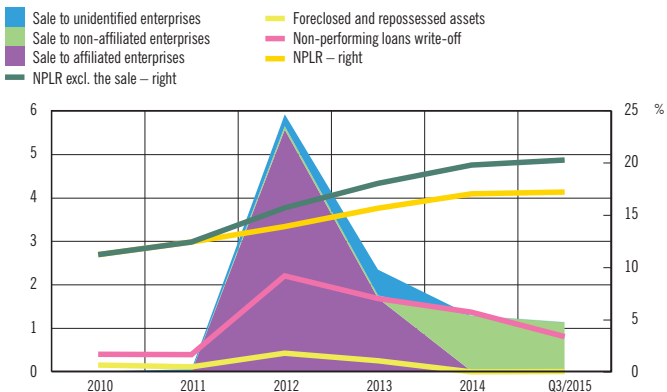


Figure 90 Assessment of the practice of resolving insolvency issues, as % of CEE average

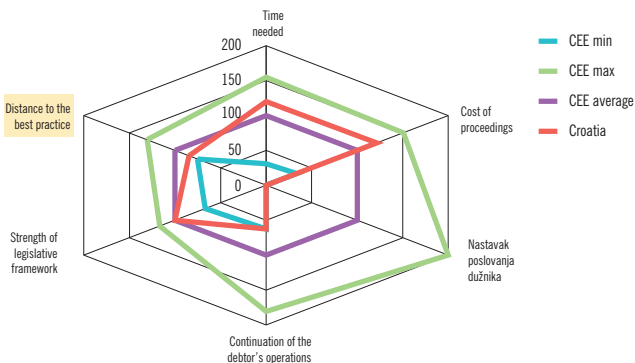
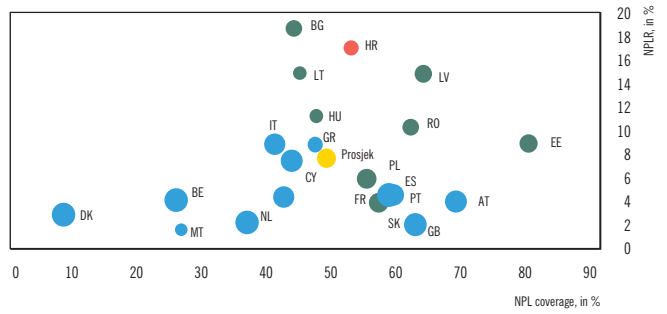


Figure 91 International comparison of loans quality and assessment of the practice of resolving insolvency issues



Despite favourable developments regarding the quality of the credit portfolio on an aggregate level, differences among banks continue to increase primarily due to the differences in their portfolio structures (Figure 87). The distribution of the change in the shares of non-performing loans shows that it went down in most banks over the last year, which is to the greatest extent a result of the sale of non-performing loans. The greatest increase in the loan quality was achieved by several banks where the acceleration of credit growth led to the dilution of the share of non-performing loans.

### Solving the issue of non-performing loans

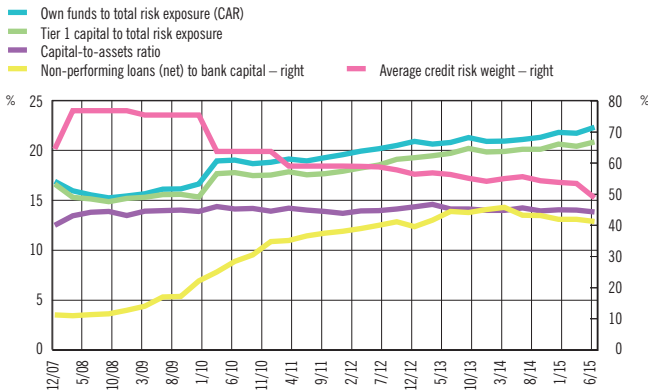
The sale of non-performing loans largely contributed to the reduction in the burden on capital arising from such loans (Figure 92). Without it, the share of non-performing loans at the end of June would have totalled some 20%, that is, three percentage points more (Figure 89). Until 2014, sale to associated companies was the dominant form of sale, while in the first half of 2015 such sales were exclusively transactions with unrelated companies. In addition, the sale of placements in 2015 was related to household loans, while previous sale activity was focused on placements to the corporate sector.

The latest assessment by the World Bank<sup>19</sup> on the success in resolving the issue of insolvency indicates the still poor performance of the practice in Croatia compared with other CEE

19 The World Bank calculates the distance to frontier score for insolvency proceedings within its publication Doing Business. The index is composed of two components: the recovery rate and the strength of the legal framework. Croatia stands out among the Central and Eastern European countries as a country with the greatest distance to frontier score. However, although this publication provides a comparison of practices in the Republic of Croatia and peer countries, its results should be interpreted with caution as they are based on estimates, while the practical implementation of the regulations assessed may be different.



Figure 92 Capital adequacy ratios



Source: CNB.

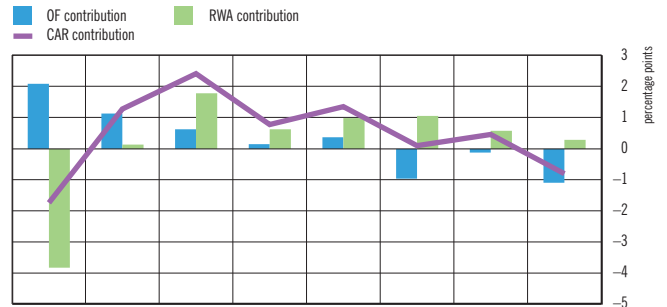
countries. According to the criteria for assessment of the practice of resolving insolvency issues Croatia ranked below the CEE average, with only the strength of its legislative framework being assessed as average (Figure 90). A possible stronger credit growth might stimulate the resolution of the issue of non-performing loans by boosting earnings which alleviate the burden of write-off that is inherent to the activity of sale. Therefore, it is important to stimulate the process of improving bank balance sheets from the “outside” that is by strengthening the regulatory framework. In addition to more effective court practice, this refers to legal solutions regarding the process of pre-bankruptcy settlements and bankruptcy of natural persons, which are currently being drafted and which could be helpful in this process. Although banks operating in Croatia are adequately capitalised and liquid, the resolving of the issue of non-performing placements is important in order to reduce the perception of risk and to activate assets currently locked in such placements. Croatia currently belongs to the group of EU countries with the highest share of non-performing loans (Figure 91).

It is noteworthy in relation to the sale of non-performing placements that their sale requires bank balance sheet, or profit, strength. Namely, the process of loan sale is most often preceded by value adjustment, which results in costs for banks and if the loan is sold below the price on the books, that portion of the value needs to be written off. Therefore, realised bank losses constitute an aggravating circumstance for the success of further improvement of banks’ balance sheets.

## Bank capitalisation

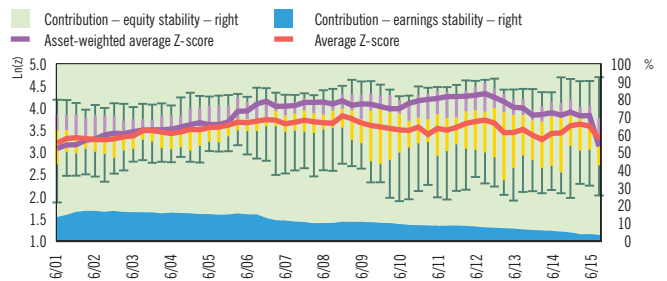
The sector capitalisation, measured in terms of the equity-to-assets ratio, fell for the first time since the outbreak of the crisis to 12% at the end of September 2015. Apart from the process of conversion of loans in Swiss francs, the pressure on sector capitalisation came from owners, that is from increased dividend payments and from a continued rise in the coverage of non-performing loans. On the other hand, the average risk

Figure 93 Contributions to the change in the capital adequacy ratio



Note: The growth of the capital adequacy ratio may be the result of the growth in own funds or the fall in risk-weighted assets.  
Source: CNB.

Figure 94 Structure and distribution of Z-score



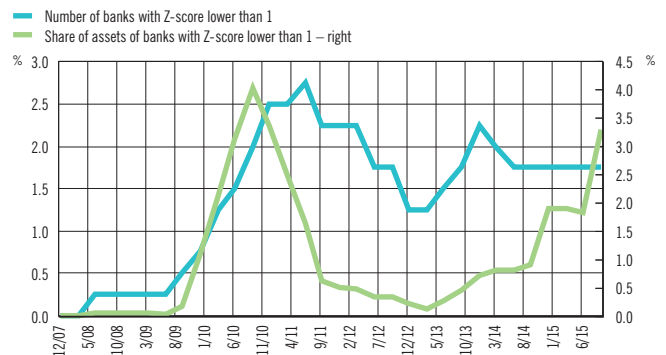
Note: The Z-score is a widely accepted indicator of the individual stability of banks and is calculated as:

$$Z = \frac{k + \mu}{\delta}$$

$Z = (k + \mu) / \sigma$  in which  $k$  is the equity and assets ratio,  $\mu$  is the average indicator of ROA (in the last two years) and  $\sigma$  is the volatility of earnings (standard deviation of profitability of assets for the last two years). A higher score denotes a higher stability of the bank, i.e. a lower risk of bank failure. Also, the score can be divided into two components: earnings stability index and equity stability index.

Source: CNB.

Figure 95 Average number and share of assets of banks with a weakened solvency in the last year



Note: The value of Z-score of 1 was set as the threshold of a weakened solvency of banks. At this value, the level of earnings volatility is 100% of the sum of equity and bank’s earnings which should provide hedge against this volatility.  
Source: CNB.

weight continued falling, thus positively affecting the capital adequacy ratio. Since the onset of the crisis the capital adequacy ratio has increased, predominantly due to the fall in the average risk weight, while the latest sizeable recapitalisation of the sector was registered in 2008 as a result of a macroprudential policy measure penalising exposures to clients unhedged against foreign currency risk (Figures 92 and 93).

Banking sector insolvency risk increased under the influence of decreased profitability and capitalisation. The share of the contribution of stability of capital to total stability continued growing thus pointing to the danger of possible capital reduction (Figure 94). In addition, the share of banks with a Z-score below 1 increased, which is a result of the one-off cost of conversion of loans in Swiss francs (Figure 95).

## Box 5 International comparisons of bank profitability<sup>1</sup>

Since banks in Croatia belong to international financial groups (more than 90% of banking sector assets belongs to foreign-owned banks), tracking bank performance in comparison to other banks from the same group but also from the country of origin of the owner is very important because owners view banks as investments and may shift capital from one group member to the other. In addition, bank earnings are part of their capital so understanding bank profitability is the key to understanding bank capitalisation and resilience. Accordingly, a better understanding of bank performance both in the domestic and in the international context is important for more efficient implementation of the macroprudential policy, which is founded on the understanding of bank profitability determinants as the first line of defence against shocks.

Bank profitability rapidly decreased during the crisis in the CEE and euro area countries, with the decrease being greater in CEE countries where the profitability before the crisis was greater, generally speaking. However, the largest falls in profitability in the euro area and the CEE countries were not registered at the same time. Bank profitability in the euro area dropped the most in 2008, while CEE countries followed a year later (Figure 1).

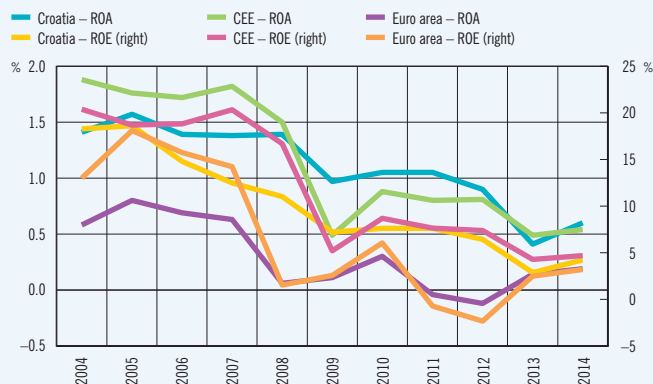
The dynamics of the most used bank profitability measures, the ROA and the ROE, differ to an extent as a result of the changes in the intensity of financial leverage usage over the period in question. The reduction in the financial leverage that was registered in all observed banking systems caused ROE to fall more steeply than ROA. However, in contrast to the CEE average, in Croatia financial leverage went down the most in the period from 2006 to 2008 when there was a wave of bank recapitalisations spurred by macroprudential policy measures (Figure 3). After that, bank capitalisation, that is the leverage level, remained relatively stable.<sup>2</sup>

The reasons behind the decline in bank profitability during the financial crisis differ across comparable groups. Thus, in the CEE countries and in Croatia the main determinant of change in bank profitability was the materialisation of credit risk. The greatest increase in the cost of value adjustments in CEE countries was registered in 2009 when non-performing loans grew substantially, while in Croatia it happened again in 2013 when changes to the classification of placements were introduced (Figure 2). The ratio of value adjustment costs to assets is much lower in the euro area than in CEE countries and in Croatia. This is a consequence of slightly better macroeconomic performance but also of the lower share of loans in assets (Figures 2 and 5). The greatest fall in bank profitability in the euro area was seen in 2008 due to unfavourable changes in international financial markets, that is, when banks suffered high trading losses, and not in 2009, when credit risk materialised.

<sup>1</sup> The data in the presented analysis have been taken over from the Bankscope BVD database and refer to banks with assets exceeding EUR 500.000.

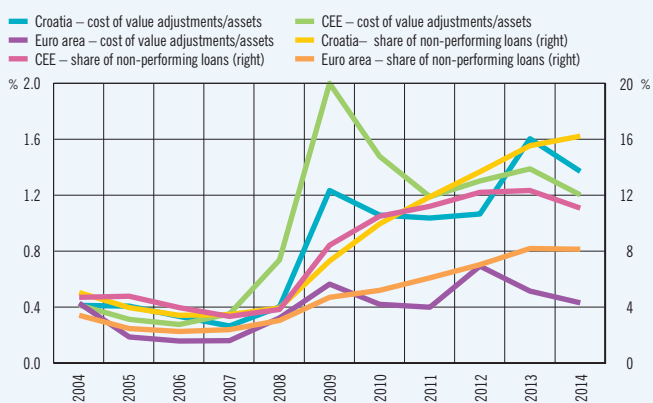
<sup>2</sup> More precisely, on two occasions, in 2006 and 2006, risk weights for exposures to CICR were increased, stimulating banks to increase their capitalisation in order to be able to continue providing housing loans.

Figure 1 Profitability of bank assets and capital



Source: Bankscope.

Figure 2 Indicators of credit risk materialisation

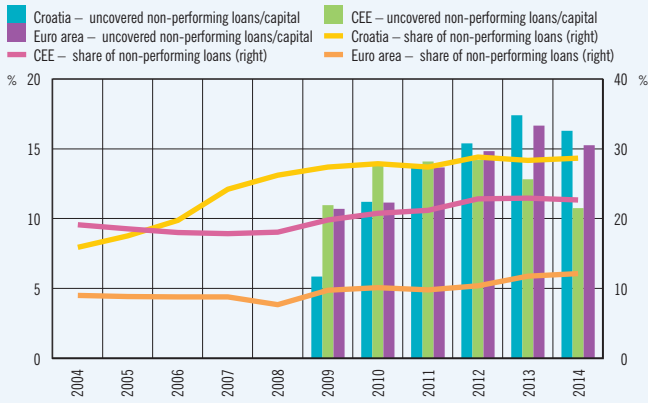


Source: Bankscope.

Despite the negative effect on profitability, higher costs of value adjustments in CEE countries and in Croatia pushed down the burden on capital arising from uncovered non-performing loans. According to this criterion, bank capital in CEE countries is less jeopardised than it is in the euro area as a result of the strong growth of value adjustments earlier during the crisis and the fall in the share of non-performing loans after 2012. The rise in loan quality in CEE countries may be associated with economic recovery, so the fall in the value adjustment costs after 2013 might announce a new trend. In contrast to the CEE average, in Croatia the share of non-performing loans continued to grow in 2014, while the fall in the burden that credit risk poses on bank capital was reduced due to changes in the placement classification rules and their sale. In the countries of the euro area the share of non-performing loans is low but the ratio of equity to assets is also much lower, which leads to a higher indicator of the burden on capital arising from credit risk than in CEE countries (Figures 2 and 3).

Apart from value adjustment costs, the materialisation of credit risk also reduces the operating profitability of banks, that is, the implicit lending

Figure 3 Indicators of capitalisation

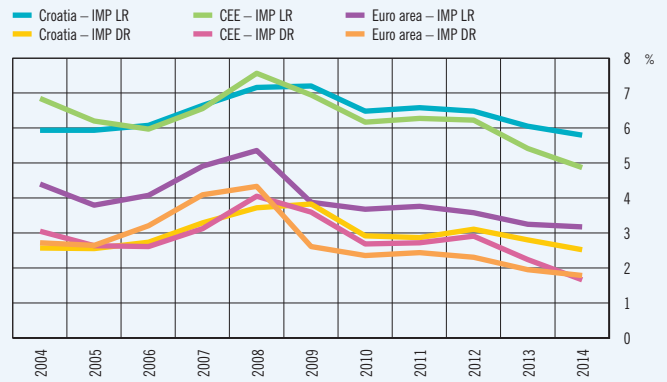


Source: Bankscope.

interest rate of banks decreases due to the growth of irrecoverable loans. In CEE countries banks realised much higher implicit lending rates than banks in the euro area, while they paid only slightly higher funding costs, which resulted in a much higher net interest margin. Compared to the CEE average, banks in Croatia charge (slightly) higher implicit lending rates but also pay slightly higher deposit rates in comparison to other countries in the CEE, which results in a similar net margin predominantly ranging around some 3%. After 2011, the implicit lending rate in Croatia went down much less than in the CEE average, the reason for this being a much higher country risk premium (Figure 6 in the Macroeconomic environment section). Although the dynamics of implicit lending rates reflects the dynamics of lending rates, a slightly higher implicit deposit rate in Croatia, assuming the credit portfolio structure remains the same, also reflects a higher embedded risk premium due to the higher level of non-performing loans (Figures 4 and 5).

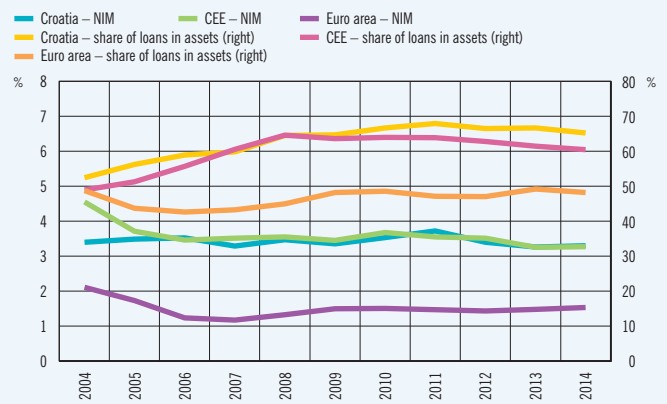
Apart from the difference in net interest margin, bank profitability also depends on the share of loans in assets, with a higher share leading to a higher net interest margin. Data indicate that banks in the euro area have a much lower share of loans in their assets compared to banks from CEE countries, which leads to lower net interest margin but also to lower value adjustment costs related to assets (Figure 2 and 5). In addition, banks in Croatia had, until the crisis, a slightly lower share of loans in their assets than banks from CEE countries, while the situation has been the reverse in the post-crisis period. Such developments were spurred by macroprudential policy measures. Namely, in the period before the onset of the crisis, during faster growth of bank exposures, the CNB raised the price of bank borrowing which spilled over into the growth of lending, i.e. risk, by employing its macroprudential policy measures. After the crisis started, macroprudential policy measures eased the restrictions imposed earlier, with the objective of increasing loans to the real sector so the effective cost of bank borrowing was lower and the share of loans in assets higher (Figure 5).

Figure 4 Developments in bank implicit rates



Source: Bankscope.

Figure 5 Net interest margin and share of loans in assets



Source: Bankscope.

In conclusion, the differences in bank profitability across CEE and the euro area countries are significantly marked by banking traditions, with banks in CEE countries being traditionally more oriented towards deposit and lending operations and less towards the financial market. In addition, macroeconomic conditions and risk profiles of these countries differ considerably, with euro area countries boasting a slight recovery. Compared to the average of CEE countries, banks in Croatia registered below-average value adjustment costs until 2012. This stimulated their profitability. However, this was interrupted by changes in the rules on the classification of placements in 2013, causing value adjustment costs to rise and thereby reducing the burden on capital arising from uncorrected non-performing loans, which in turn strengthened bank resilience.

# Stress testing of credit institutions

The importance of classic stress testing at a credit institution lies primarily in the fact that this specific macroprudential tool helps regulators to assess the current ability of credit institutions to withstand unexpected losses after the materialisation of systemic risks. Such information enables the formulation of policies aimed at ensuring more than just the mere business continuity of individual banks for it also endeavours to ensure sufficient system capacity for the uninterrupted provision of financial intermediation services under such stress conditions, consequently limiting their duration and contributing to faster economic recovery. In this context it is equally important openly and critically to evaluate the results of the testing. However, it is noteworthy that the credibility of the entire exercise largely depends on the ability reliably to replicate the dynamics of past crises and encompass relevant interactions and nonlinearities.<sup>20</sup>

Table 5 Macroeconomic scenarios

Indicators	Baseline scenario		Adverse scenario	
	2016	2017	2016	2017
Financing conditions on the foreign market				
ECB reference rate, %	0.05	0.05	0.05	0.05
EURIBOR (3M), %	-0.04	-0.04	0.76	0.76
GDP (real growth EU), %	2.00	2.10	-1.60	-0.10
Financing conditions on the domestic market				
Bond yields, change in p.p.	0.50	0.40	2.29	0.58
Long-term interest rates, change in p.p.	-0.25	-0.19	0.39	0.69
Short-term interest rates, change in p.p.	-0.08	-0.04	1.76	1.11
Money market interest rate, change in p.p.	0.03	0.00	7.33	-2.60
Exchange rate				
EUR	7.62	7.61	8.38	8.38
CHF	6.99	6.84	8.06	8.05
Real sector				
Investment, real (yoy, %)	2.4	4.6	-3.0	-0.5
Personal consumption, real (yoy, %)	1.5	1.6	-3.6	-7.3
GDP, real (yoy, %)	1.8	2.0	-2.9	-3.6
Unemployment rate (%)	17.3	16.8	18.4	20.2
Real estate prices (yoy, %)	-0.6	-0.4	-4.7	-0.4
Consumer prices (yoy, %)	0.9	1.6	2.1	2.1

Source: CNB.

The domestic financial system is capable of withstanding highly unlikely but plausible shocks. This is aided by a shift towards the policy of more conservative value adjustment, the accelerated sale of non-performing loans and stabilisation of earnings by orientation toward the perceived less risky financing of the government. Nevertheless, a relatively high public debt amid accumulated risks could quickly become the catalyst of serious systemic disturbances. And while the current measures of capital and liquidity buffers would suffice, the capitalisation of the system proved to be more fragile than in previous tests, with some subcategories of institutions being especially vulnerable. In this context the continued deleveraging of banks with respect to their owners is also worrying, as is the increase in dividend payments.

20 Galati, G., and R. Moessner (2011): *Macroprudential policy – a literature review*, BIS Working Papers No 337; BIS (2015): *Making supervisory stress tests more macroprudential: Considering liquidity and solvency interactions and systemic risk*, BIS Working Paper 29.

The tests which are based on the simulation of shocks over a two-year horizon<sup>21</sup> provide simulation conditions significantly different to those in the previous version of the integrated solvency and liquidity tests. In addition to the initial bank positions being undermined by the costs of conversion of loans indexed to the Swiss franc, the medium-term growth outlook has also been altered. Some improvements in the methodological framework should be underlined as well, such as: (i) the introduction of the variable parameter of secondary liquidity disturbances<sup>22</sup> based on the measurement of induced stress in the financial markets and (ii) differentiation of the degree of deposit outflow from individual institutions in stress conditions depending on the risk of concentration in their liabilities<sup>23</sup>.

## Simulated scenarios

### a) Baseline scenario

The expected developments in the economy, which inform the baseline scenario used in this test, are based on the CNB's monetary projection<sup>24</sup> as they assume the speedy recovery of economic growth. This would surely be underpinned by continued favourable financing conditions in the foreign markets, aided by the firm commitment of the European Central Banks to injecting liquidity via securities repurchase in the secondary market and ensuring low borrowing prices. At the same time, there are signs of potentially negative divergent real developments, such as faster growth in the US and the EU on one side and pro-recessionary developments in Asian and Latin American economies caused, among other things, by further decline in the prices of energy and partially also by the unfavourable influence of the change direction of the Fed's policy on the other.

However, these developments might precisely serve as the short-term recovery model as long as deflationary impulses generated in the energy market continue to support the disposable income of households and corporates, without at the same time jeopardising global demand and thus turning the trends in Croatia's main trading partners. The listed stimuli can hardly be considered sufficient to strongly restrain the disequilibrium processes in the economy, which would ensure a stronger investment cycle. However, it may be expected that capital investments of the private sector will go up slightly and that it will come to a certain de-accumulation of the inventories accumulated during the

21 Initial shocks are distributed, as in the prior cycles of the exercise in the first four months, while the deterioration of business conditions in the remainder of the simulation horizon is a result of the endogenised reactions by all sectors. (for basic methodological remarks, see Financial Stability, No. 14, Box 5 New methodological approach to stress testing).

22 See *Financial Stability*, No. 12, Box 4 Analysis of short-term resilience of the banking sector to liquidity shocks.

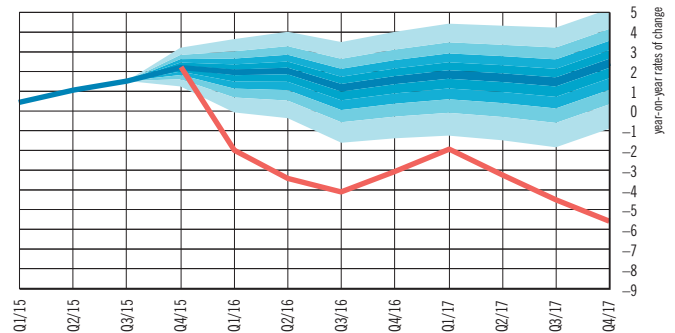
23 See Box 3 Preliminary measurements of deposit concentration risk.

24 *CNB Bulletin*, No. 220, Year XXI (<http://www.hnb.hr/publikac/bilten/arhiv/bilten-216/ebilt216.pdf>).

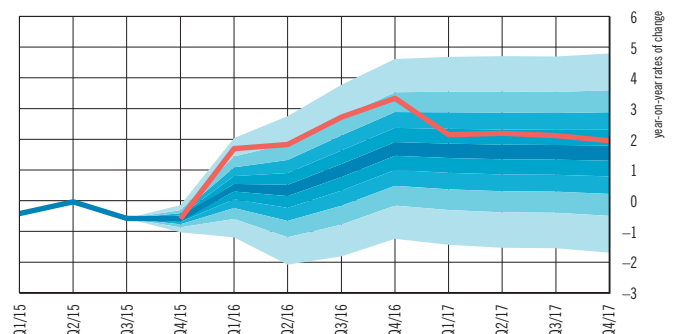
recession. The existing structural weaknesses are also reflected in the relatively high level of risk premium for Croatia compared with its Central and Eastern European peers. This partially reflects the risks inherent to the high public debt that creates the

Figure 96 Adverse scenario probability

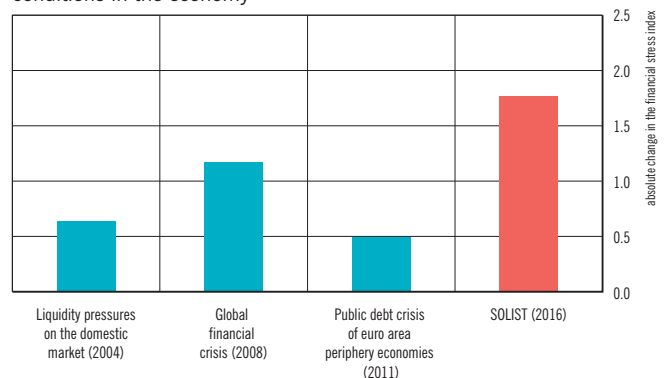
a) GDP dynamics under the adverse scenario relative to the risks of materialisation of the baseline scenario



b) Consumer price dynamics under the adverse scenario relative to the risks of materialisation of the baseline scenario



c) Degree of disturbance in the financial market induced by stress conditions in the economy



Note: The baseline scenario is in line with the monetary projection of the CNB; the red colour represents the path of the underlying variable under the adverse scenario.  
Source: CNB.

need for further fiscal consolidation and that will continue to limit public spending and the potential of the fiscal multiplier.

### b) Adverse scenario

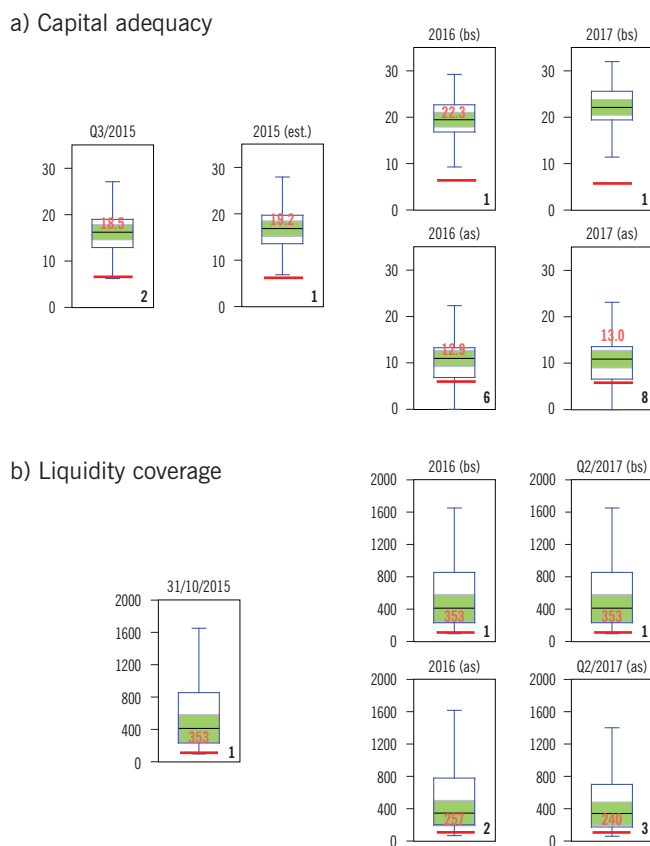
The simulation of stress conditions in this iteration emerges from the risks connected with previously presented growth models. The scenario of continued profit erosion in less developed markets, but also in some Western economies, entails the assumption of a contraction in investments and a strong slow-down or even decline in economic activity, which would cause a crisis in the euro area. The consequent turbulences in financial markets would arise due to the increase in risk aversion and capital outflow spurred by lowered profitability and divergent interest rate policies pursued by the Fed and the ECB. The new liquidity problems are tough on the EU, where quantitative easing programmes have failed to reverse negative trends. To the contrary: borrowing costs went down, especially at the EU periphery, where, on the other hand, the tax base was weakened, so current revenues were not sufficient to cover fiscal needs easily.

The presented adverse scenario is simulated as a possible final stage of a three-phase development process of a global crisis. The first blow of 2008 induced unorthodox policies of expanding money (M1) on a scope rarely seen in history, and already in 2011 the countries in the euro area periphery faced problems in servicing their public debt with consequent stress-linked disturbances in financial markets, including Croatia. Their calming, together with the subdued growth perspective, caused a renewed monetary policy reaction striving to achieve higher liquidity and lower yields. The consequence was easier borrowing but without any larger inflationary impulses or clear signs of a long-term revitalisation of the real investment activity. That process created the risk of simulated sudden and strong decompression of the risk premium, which might be especially hard on some highly-indebted public sectors, as is the case in Croatia.

The exogenous factors in the form of the escalating refugee crisis and negative consequences on the domestic tourist sector, which accounts for a substantial share in the gross value added, are not to be underestimated. Within several months of the start of such a scenario, Croatia might face a new contraction of real economic activity. The consequent decrease in aggregate income in the domestic economy would average 3.3% in a two-year simulation horizon (compared with the expected slight growth of 2.0%). Under such conditions, the budget deficit projection would become unattainable and the majority of consolidation measures insufficient.

This scenario incorporates the change in the business strategy of domestic banks, already reflected in the recent stagnation of placements to the public sector as a serious limitation for the financing of the government's current expenditures and refinancing of its current liabilities<sup>25</sup>. This puts into question banks' "technique of reducing" risk that was based on the growth of assets with lower risk weight (investments in government assets) amid the circumstances of uncertain economic recovery.

Figure 97 Solvency and liquidity of credit institutions under the baseline and adverse scenario



Note: a) The red line shows the threshold value of the capital adequacy ratio of common equity, tier 1 capital (6.5%), i.e. the liquidity coverage ratio (100%); b) The red colour represents the liquidity coverage ratio, i.e. the capital adequacy ratio on system level (based on the consolidated balance sheet, while for individual institutions, the negative accounting values of capital were reduced to zero); c) The number of institutions which have not passed the test (in the solvency and liquidity block) is shown in the lower right angle. Source: CNB.

Consequently, the country risk premium would increase to the 2011 level. The simulated initial yield increase under the adverse scenario was 229 basis points, which together with the growth in the price of borrowing in the foreign market would contribute to the decrease in value of government bonds in banks portfolios by an average of some 11%.

The degree of stress disturbance and tension among the participants in the domestic financial market, induced by this scenario, probably exceeds the examples registered in the past decade (Figure 96 under c). Under the scenario in question, pressure on foreign exchange liquidity paired with a growing lack of confidence in the domestic currency would lead to extreme

<sup>25</sup> One should specially stress the relatively substantial maturities of T-bills due in the middle of 2016.



exchange rate volatility, which the central bank could smooth by intervening in the market with a certain time lag. The kuna euro exchange rate would depreciate on a one-time basis by 10% on average, which corresponds to the depreciation shock of the banking crises from the late 1990s<sup>26</sup>. At the same time, the interest rates on the money market would jump, initially by more than 730 basis points. The interest rate shock would be subdued until the end of the simulation horizon but only after the easing of tensions in the foreign exchange market. Nevertheless, the secondary effects of the materialisation of the currency-induced credit risk would not be avoided.

The pressures on government finances would result in “forced consolidation” which implies a noticeable illiquidity in the real sector. Amid such conditions, employment may be expected to fall (which is more likely than a wage freeze, due to labour market reforms), investments to contract, and the available income of households to face a new fall. There are also the negative effects of the post-election cycle that, as a rule, additionally pushes down consumer confidence.

Balance sheet effects would work in the same direction given that the central bank’s efforts to reduce the degree of euroisation are still limited in their scope. Thus the exposure of the private sector to currency risk remains relatively high, concomitant with a degree of deposit concentration that provides for relatively quick change in the currency structure. Such circumstance would also cause a significant deterioration in the financial availability of housing loans and thus additionally deepen the illiquidity in the real estate market. However, the consequent price correction would be relatively mild (by –4%). Yet, as in the previous situations, it should be borne in mind that this reduces the function of real estate as high quality collateral, with a negative feedback on real developments via the so-called wealth effect.

### c) Initial simulation conditions

The joint probability of a thus-formulated adverse scenario is acceptably small, as shown by the probabilities of materialisation of negative risks for the expected economic growth and inflation in the projection horizon (Figure 97 under a and b). The simulated low inflation is a result of the decline in the prices of oil and commodities in the global market, which has a deflationary effect and strong inflationary developments in the domestic market under the influence of the depreciation of the kuna but also of the increase in administratively regulated prices as one more attempt to stabilise fiscal revenues at a time of crisis. In the period immediately before this test two institutions were close to or below the tolerance threshold set for the

<sup>26</sup> The influence of the depreciation of the kuna against the Swiss franc based on the thus far least favourable ratio between the two currencies is included in the simulation horizon, although the impact is limited due to the conversion of loans indexed to Swiss francs that was included in 2016 and the base effect used in the calibration of cross-currency ratios.

minimum capital requirement and almost a half of institutions registered losses, of which the highest by largest banks, totalling HRK 7bn cumulatively, as a result of the conversion of loans indexed to the Swiss franc<sup>27</sup>. In this context the possible continuation of deleveraging of banks towards their owners and the increased dividend payments are additionally worrying. On the other hand, the policy of conservative value adjustment and the accelerated sale of bad loans do increase banking sector resilience.

## Simulation results<sup>28</sup>

### d) Sensitivity to conditions in the baseline scenario

In the baseline scenario the share of non-performing loans went up only slightly, partly due to the relatively modest economic recovery and partly due to the inertia that is legally embedded into the rules on the reclassification of partly irrecoverable placements<sup>29</sup>. The aggregate portfolio thus contained some 18% of non-performing loans at the end of a two-year horizon, while at the end of September 2015 this share stood at 17.3%. This growth had primarily to do with the change in the share of non-performing loans to corporates, from 32.2% to 36.6%. In the same period, the share of non-performing consumer loans went up from 13.2% to 13.5% and that of housing loans from 9.2% to 9.6%. The induced rise of value adjustment costs was moderate if the cost of the aforementioned conversion is excluded (some HRK 6.9bn), which lowered the Common Equity Tier 1 rate by approximately 2 percentage points. It went down from 20.6% at the end of 2014 to 18.5% in September, while in December it is expected to recover slightly to 19.2%, thanks to accumulated earnings. The baseline scenario assumes a stable growth of gross earnings in the following two years<sup>30</sup>. This, paired with the slight increase in non-performing loan provisions and the write-off of the principal after the conversion of loans indexed to the Swiss franc, will increase the capitalisation of the banking system, to 22.3% in 2016 and 25.0% in 2017.

At the same time, the traditionally good short-term liquidity of the financial system was additionally improved in the second half of 2015 so “surplus” liquidity in the system was at the end of October six times higher than the required regulatory minimum. This reflects the expansionary monetary policy of the central bank but also weak demand for loans. There was only one institution at the end of October that had insufficient li-

<sup>27</sup> After bankruptcy proceedings (three banks from 2010 to date) and multiple recapitalisations aimed at complying with regulators standards, at the end of last year one bank became the subject of resolution actions.

<sup>28</sup> The testing does not take into account the potential effects of the increase in assets (dilution effect), recapitalisation and write-offs or sale of non-performing loans.

<sup>29</sup> See the Decision on the classification of placements and off-balance sheet liabilities of credit institutions, OG 89/2013.

<sup>30</sup> The costs of loan conversion in Swiss francs are limited to 2015 and should not have new impact on bank profits in the upcoming period.



quidity buffers as defined by the liquidity coverage ratio (LCR). However, this deficit of liquid assets relating to net liquidity outflows was relatively small<sup>31</sup>.

#### e) Sensitivity to stress conditions

Contrary to the relatively favourable baseline scenario, the economic and financial shocks simulated in the adverse scenario quickly eroded the creditworthiness of clients, primarily corporates, whose delinquency in meeting their credit liabilities raised the share of corporate non-performing loans to 52% until the end of the two-year horizon. The share of non-performing loans of households also went up noticeably, although at a slower pace (estimated to reach 17.5% by the end of 2017), while in housing loans this share exceeded 10%. The share of total non-performing loans will reach 26% by the end of 2017. Under the adverse scenario the earnings effectively decline cumulatively in 2016 and 2017 by slightly over one third compared to the baseline scenario, while provisions almost double, effectively.

The results of stress testing at credit institutions continue to demonstrate that their capacity for absorption of potential losses is satisfactory but noticeably weakened from the previous iterations in the stress testing exercise, which calls for caution. The projected system capitalisation averages at 13%. Nevertheless, a small number of institutions show certain weaknesses and indicate the need for special attention from the regulator and in the forthcoming time a tightening of capital requirements. Namely, under the projected adverse conditions, the adequacy rate of the Common Equity Tier 1 capital would drop to below the critical value (6.5%) in eight credit institutions. At system level, they generated a capital deficit of only 0.22% until the end of the two-year simulation horizon. However, within that group of banks, it turned out that as many as four needed to be recapitalised (compared to the test values), by as much as 3%.

The above mentioned ample short-term liquidity, although lowered, remained high and helped reduce the sensitivity to shocks,

so the LCR at system level totalled as much as 257% at the end of 2016<sup>32</sup>. Despite the relatively higher loss of liquidity buffers due to stronger initial liquidity shocks (especially the revaluation of the available portfolio of government securities), stronger disturbances in the financial markets (Figure 96 under c) and pronounced secondary effects<sup>33</sup> compared to the previous stress tests, only two institutions had unsatisfactory liquidity profiles (LCR below 100%). In 2017, not even the projected deposit outflows due to capital losses managed to substantially jeopardise system liquidity (LCR = 240%), although this shock depleted the buffers of one more credit institution (in the middle of 2017 the LCR of altogether three institutions was lower than 100%). Thus the aggregated shortage of liquidity buffers at the end of the simulated stress horizon reached only 2.5% of simulated net liquidity outflows, although some institutions might have problems in rehabilitating their liquidity profiles, especially in the case of more significant disturbances in the financial markets, which indicates potential weaknesses in their current liquidity risk management policies.

The results of the integrated stress tests clearly show that banks did not manage to lower their risks by transferring the focus of their lending activity from private to the government sector. They only changed the source and postponed its possible materialisation. Nevertheless, the domestic banking system is still, even seven years after the crisis, able to sustain the blows that might jeopardise the business continuity of individual credit institutions. In conclusion, the current regulatory measures for protection against risks are sufficient, generally speaking, although some subcategories of institutions are obviously very vulnerable. This warrants caution and a step away from a single interpretation of standard solvency and liquidity parameters. For instance, capital surplus should be critically evaluated through the prism of the probability of its withdrawal. At the same time, accumulated surpluses of liquidity coverage indicate that liquid banks need not necessarily be solvent as was confirmed by the example of the one institution that underwent the resolution process last year.

31 A conservative LCR threshold of 100% was applied in the conducted stress testing, while the current regulatory requirement stands at 70% and accordingly no institutions has insufficient liquidity buffers.

32 Information and assumptions about liquidity coefficient and sensitivity of liquidity parameters are preliminary in their nature.

33 Indirect contagion risk and idiosyncratic reputation risk (see more in Box 5 of *Financial Stability*, No. 14).

## List of figures and tables

Financial stability map	7	Figure 24 General government debt	21
Figure 1 Risk map	8	Figure 25 General government deficit	21
Table 1 Economic growth, exports and industrial production in selected developed and emerging market countries	10	Figure 26 Public debt	22
Figure 2 Economic sentiment and business confidence indices	10	Figure 27 Maturity breakdown of public debt	22
Figure 3 Key interest rates of the main central banks and leading market interest rates	10	Figure 28 Currency breakdown of public debt	22
Table 2 Fiscal balance and current account balance in selected developed and emerging market countries	11	Table 4 Thresholds of the fiscal sustainability risk indicator	22
Figure 4 CDS spreads for 5-year bonds of selected euro area countries	11	Figure 29 Yield on primary issue of euro and euro-indexed securities	23
Figure 5 CDS spreads for 5-year bonds of selected banks	11	Figure 30 General government deficit	23
Figure 6 CDS spreads for 5-year bonds of selected emerging market countries	11	Figure 31 Financing needs	23
Figure 7 Yields on Croatian and benchmark German bonds maturing in 2018 and their spread	12	Figure 32 Projection of public debt under various scenarios	23
Figure 8 Price to earnings ratio of leading global stock exchange indices	12	Figure 33 Public debt growth rate (2009 – 2015)	24
Figure 9 Foreign capital inflows and GDP growth in Croatia	12	Figure 34 Average remaining maturity of general government debt	24
Table 3 Public and external debt in selected European emerging market countries	12	Figure 35 General government interest expenses	24
Figure 10 GDP growth pattern (contribution to growth)	13	Box 2	
Figure 11 Savings and investment – total and by sector	13	Figure 1 Structure of Croatian financial sector assets, end-June 2015	26
Figure 12 External debt by domestic institutional sector	13	Figure 2 Degree of maturity mismatch and degree of leverage use, by the type of non-bank financial institutions, end-June 2015	26
Figure 13 Total external debt by creditor	14	Charts 1 and 2 Mutual claims and liabilities of banks and non-bank financial institutions	27
Figure 14 Short-term external debt	14	Figures 3 and 4 Exposures of non-bank financial institutions to banks and maturity structure of these exposures (claims of non-bank financial institutions against banks), end-June 2015	27
Figure 15 Selected indicators of external vulnerability	14	Figures 5 and 6 Exposure of banks to non-bank institutions (bank claims against non-bank financial institutions), end-June 2015	27
Figure 16 Projection of external debt principal payments in 2016 by sectors	14	Table 1 Matrix of mutual exposures of individual sectors within the financial system, end-June 2015	28
Figure 17 Yield curves of Croatian bonds issued on the domestic and foreign markets by currency	14	Figures 7 and 8 Exposure of non-bank financial institutions to the government and maturity structure of these exposures (claims of non-bank institutions against the government)	28
Figure 18 Optimal international reserves – contribution of individual components	14	Figures 9 and 10 Reliance of non-bank financial institutions on foreign financing sources and maturity structure of these sources	29
Figure 19 Real kuna/euro exchange rate	15	Figure 36 Change in and stock of household debt	30
Figure 20 Unit labour cost	15	Figure 37 Change in and stock of household financial assets	30
Figure 21 Total debt by sector	15	Figure 38 Household financial assets	31
Figure 22 Kuna/euro and kuna/Swiss franc exchange rates and overnight interest rates	15	Figure 39 Net financial assets of households in CEE countries	31
Figure 23 Changes in employment registered with the Croatian Employment Service (CES)	15	Figure 40 Household loans by purpose	31
Box 1		Figure 41 Annual rate of change in debt and loans	32
Table 1 Number of measures of macroprudential interest in EU member states and Norway on 19 October 2015	17	Figure 42 Maturity breakdown of newly-granted household loans	32
Figure 1 Number of measures implemented in individual countries	18	Figure 43 Newly-granted long-term household loans by purpose	32
Table 2 Share of measures and instruments to achieve intermediate objectives of macroprudential policy	18	Figure 44 Change in household lending criteria in the last three months	32
Table 3 Estimated intensity of measures of macroprudential interest in EU member states and in Norway	19	Figure 45 Employment and wages (seasonally adjusted)	32
Figure 2 Credit gap in EU member states	19	Figure 46 Currency breakdown of household loans	32
Figure 3 Intensity of measures of macroprudential interest relative to the initial capitalisation of the banking system and credit gap	19	Figure 47 Household loans by interest rate variability	33
		Figure 48 Household debt and debt burden	33

Figure 49 Indicators of vulnerability in the household sector	33	Figure 73 Year-on-year growth in major banking sector balance sheet items	49
Box 3		Figure 74 Structure and price of banking sector liabilities	74
Table 1 Descriptive statistics of household deposits as at 31 March 2014	35	Figure 75 Banking sector assets	74
Figure 1 Lorenz curve – savings of natural persons in the Republic of Croatia as at 31 March 2014	35	Figure 76 Net financial position of banks with respect to foreign owners	74
Figure 2 Schematic representation of the number of depositors and the amount of deposits depending on the type of deposit as at 31 March 2014	36	Figure 77 Liquidity indicators	74
Figure 3 Gini coefficient of concentration by banks	36	Figure 78 Bank exposure to direct risks	74
Figure 50 Annual change of the real estate sector debt	38	Figure 79 Interest rate risk	51
Figure 51 Household debt, unemployment rate, consumer optimism and real estate market expectations	38	Figure 80 Share of unhedged loans in total loans exposed to CICR	51
Figure 52 Housing loans and residential real estate price index on a quarterly basis	39	Figure 81 Change in selected business performance indicators	52
Figure 53 Comparison of interest rates on newly-granted housing loans in Croatia and the euro area	39	Figure 82 Indicators of returns	52
Figure 54 Financial availability of residential property	39	Figure 83 Decomposition of the change in the return on assets	52
Figure 55 Indebtedness of the non-financial corporate sector	40	Figure 84 Selected interest rates (quarterly average of monthly interest rates)	53
Figure 56 Change in and stock of non-financial corporate debt	40	Figure 85 Change in bank profitability in various segments of financing in the period of crisis	53
Figure 57 Annual growth rate of non-financial corporate debt	41	Figure 86 Non-performing to total loans ratio and its coverage by sectors	53
Figure 58 Year-on-year growth rates of domestic banks' external debt and loans by activity in the period from 30 September 2014 to 30 September 2015	41	Figure 87 Distribution of the ratio of non-performing loans	53
Figure 59 Comparable average prices of financing of non-financial corporate external and domestic debt (newly-granted loans)	41	Figure 88 Developments in the distribution of the ratio of non-performing loans	54
Figure 60 Change in credit standards and demand for loans to corporates	42	Figure 89 Resolution of the issue of non-performing loans in banks	54
Figure 61 Newly-granted bank loans and absolute change in the stock of gross loans	42	Figure 90 Assessment of the practice of resolving insolvency issues, as % of CEE average	54
Figure 62 Breakdown of newly-granted loans to non-financial corporations by maturity and currency	42	Figure 91 International comparison of loans quality and assessment of the practice of resolving insolvency issues	54
Figure 63 Share of corporate non-kuna debt in total loans, by maturity	43	Figure 92 Capital adequacy ratios	55
Figure 64 Share of corporate non-kuna debt in total loans, by sub-sector and activity	43	Figure 93 Contributions to the change in the capital adequacy ratio	55
Figure 65 Breakdown of bank loans to non-financial corporations by interest rate variability	43	Figure 94 Structure and distribution of Z-score	55
Figure 66 Interest rates on long-term loans to non-financial corporations in Croatia and the euro area	43	Figure 95 Average number and share of assets of banks with a weakened solvency in the last year	55
Figure 67 Interest rates on short-term loans to non-financial corporations in Croatia and the euro area	43	Box 5	
Figure 68 Indicators of vulnerability in the non-financial corporate sector	44	Figure 1 Profitability of bank assets and capital	57
Figure 69 Comparison of debt among EU-28 countries	45	Figure 2 Indicators of credit risk materialisation	57
Figure 70 Aggregate indicators by EU-28 countries	45	Figure 3 Indicators of capitalisation	58
Figure 71 Share of tangible assets in total assets and the average rate of amortisation and depreciation of tangible assets among EU-28 countries	45	Figure 4 Developments in bank implicit rates	58
Box 4		Figure 5 Net interest margin and share of loans in assets	58
Figure 1 Structural presentation of the concept of capital cost	46	Table 5 Macroeconomic scenarios	59
Figure 2 Developments in distribution of risk premia of European banks	47	Figure 96 Adverse scenario probability	60
Figure 3 Components of cost of equity for banks in the euro area	47	Figure 97 Solvency and liquidity of credit institutions under the baseline and adverse scenario	61
Figure 4 Components of cost of equity for banks in Croatia	47		
Figure 5 Overview of costs of acquiring individual sources of funding	47		
Figure 72 Selected developments in the banking sector	49		

## Abbreviations and symbols

### Abbreviations

bn	– billion	IMF	– International Monetary Fund
CAR	– capital adequacy ratio	LTIR	– long-term interest rates
CBS	– Central Bureau of Statistics	m	– million
CCE	– Croatian Chamber of Economy	MoF	– Ministry of Finance
CDCC	– Central Depository & Clearing Company	MRR	– marginal reserve requirements
CDS	– credit default swap	NFC	– non-financial corporations
CEE	– Central and Eastern European	NPLR	– ratio of non-performing loans to total loans
CES	– Croatian Employment Service	OECD	– Organisation for Economic Co-operation and Development
CICR	– currency-induced credit risk	OF	– own funds
CIHI	– Croatian Institute for Health Insurance	ON USLIBOR	– overnight US dollar London Interbank Offered Rate
CM	– Croatian Motorways	pp	– percentage points
CNB	– Croatian National Bank	RC	– Republic of Croatia
CPII	– Croatian Pension Insurance Institute	ROAA	– return on average assets
DAB	– State Agency for Deposit Insurance and Bank Resolution	ROAE	– return on average equity
EAD	– exposure at default	RR	– reserve requirements
EBA	– European Banking Authority	RWA	– risk-weighted assets
EBITDA	– earnings before interest, taxes, depreciation and amortisation	SDR	– special drawing rights
EC	– European Commission	yoy	– year-on-year
ECB	– European Central Bank	ZIBOR	– Zagreb Interbank Offered Rate
EFSD	– European Financial Stability Facility	ZSE	– Zagreb Stock Exchange
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		
HH	– households		
HREPI	– hedonic real estate price index		
HRK	– Croatian kuna		
IBIR	– interbank interest rates		
ILO	– International Labour Organization		

### Two-letter country codes

BA	– Bosnia and Herzegovina
BG	– Bulgaria
CZ	– Czech Republic
EE	– Estonia
HR	– Croatia
HU	– Hungary
LT	– Lithuania
LV	– Latvia
MK	– The former Yugoslav Republic of Macedonia
PL	– Poland
RO	– Romania
SI	– Slovenia
SK	– Slovak Republic

### Symbols

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



