



Macroprudential Diagnostics

second quarter of 2019

Year III · Number 8 · July 2019



Contents

Introductory Remarks	3
1 Identification of systemic risks	3
2 Potential triggers for risk materialisation	7
3 Recent macroprudential activities.	9
3.1 Continued application of the countercyclical capital buffer rate for the Republic of Croatia for the third quarter of 2020	9
3.2 Recommendation ESRB/2015/1 on recognising and setting countercyclical buffer rates for exposures to third countries	9
3.3 Recommendation on actions in granting non-housing consumer loans.	10
Box 1 Indirect limit on the amount of loan repayment relative to debtor's income. . .	11
3.4 Action taken at the recommendation of the European Systemic Risk Board	15
3.5 Implementation of macroprudential policy in other European Union member states	16
Analytical annex: Financing of high-technology manufacturing firms in EU countries	19
Glossary	26
List of abbreviations	27
Two-letter country codes	28

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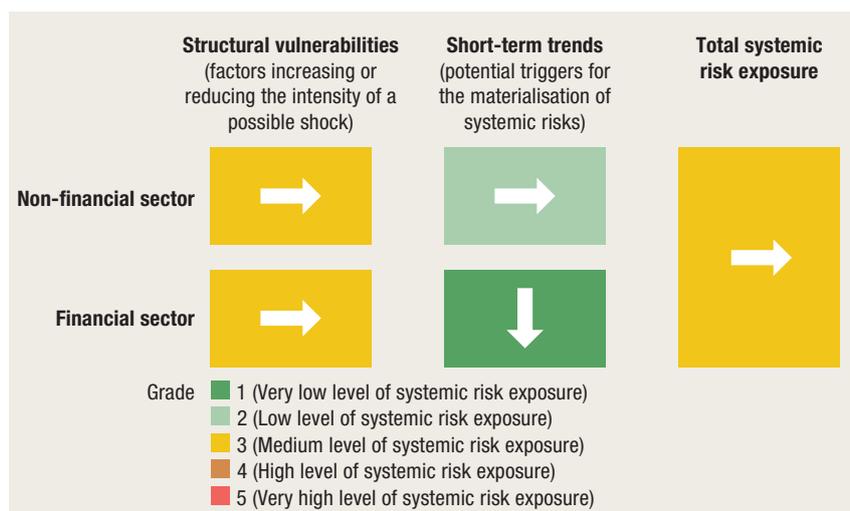
Introductory Remarks

The macroprudential diagnostic process consists of assessing any macroeconomic and financial relations and developments that might result in the disruption of financial stability. In the process, individual signals indicating an increased level of risk are detected based on calibrations using statistical methods, regulatory standards or expert estimates. They are then synthesised in a risk map indicating the level and dynamics of vulnerability, thus facilitating the identification of systemic risk, which includes the definition of its nature (structural or cyclical), location (segment of the system in which it is developing) and source (for instance, identifying whether the risk reflects disruptions on the demand or on the supply side). With regard to such diagnostics, instruments are optimised and the intensity of measures is calibrated in order to address the risks as efficiently as possible, reduce regulatory risk, including that of inaction bias, and minimise potential negative spillovers to other sectors as well as unexpected cross-border effects. What is more, market participants are thus informed of identified vulnerabilities and risks that might materialise and jeopardise financial stability.

1 Identification of systemic risks

Early 2019 was marked by a considerable acceleration in economic activity due to investment and goods exports growth accompanied by a continued increase in personal consumption. The available monthly indicators for the second quarter point to further favourable economic developments (see [CNB Bulletin, 252](#)), and according to recent projections of the CNB (see [Macroeconomic Developments and Outlook No. 6](#)) real economic activity is expected to grow in the remaining part of the year. However, the intensity of this growth could lessen slowly in the light of the anticipated unfavourable effect of the slowdown in economic activity in the European Union and major Croatian foreign trade partners. Further growth in economic activity over the medium term should lead to a further decline in the previously accumulated structural imbalances, primarily the high level of general government debt (74.5% of GDP at

Figure 1 Risk map, second quarter of 2019



Note: The arrows indicate changes in relation to the risk map for the first quarter of 2019, published in *Financial Stability No. 20* (May 2019).

Source: CNB.

the end of March 2019) and external debt (75.9% of GDP at the end of March 2019) and heightened resilience of the domestic economy.

Favourable macroeconomic developments and an improvement in the fiscal position, coupled with a fall in the general government debt-to-GDP ratio present for several years, led to a decreased risk perception of Croatia, with the CDS spread currently standing at an all-time low. Favourable developments in CDS spreads were observed in all Central and Eastern European countries, but in the last two years Croatia's CDS spread fell twice as fast as the CDS spreads in these countries, which reflects the continuous improvement in economic fundamentals in Croatia over the past few years. In the light of the improved economic fundamentals, in February 2019 the European Commission published its view that macroeconomic imbalances in Croatia were no longer excessive and in the context of their regular credit rating evaluations in March and June the credit rating agencies S&P and Fitch upgraded Croatia's credit rating to investment grade, while Moody's upheld its speculative credit rating but changed the outlook on Croatia to positive from stable in April.

Favourable developments were also observed in the private non-financial sector although its structural vulnerabilities continue to hold steady at a moderate level, primarily as a result of an unfavourable debt structure. Non-financial corporations saw an improvement in the interest rate and currency structure of debt in the first quarter of 2019, which has a favourable effect on the reduction of the sector's structural vulnerabilities. Nevertheless, their debt level is still relatively high compared to the enterprises of peer countries (new EU member states). However, some segments of that sector, such as high-technology

manufacturing corporations, have reduced considerably the use of bank loans as a form of financing and rely more on equity investment and non-bank creditors. Due to their specific business processes (for example a longer research and development horizon), the cost of financing of such corporations depends much more on the country's risk premium ([Analytical annex: Financing of high-technology manufacturing firms in EU countries](#)). As regards structural vulnerabilities of the non-financial corporations sector, unfavourable demographic developments have led to a decline in qualified workforce that could have a negative impact on future business performance of corporations.

As regards short-term vulnerabilities of non-financial corporations, favourable developments continued, reflecting good business results in 2018 and the reduced burden of debt and total indebtedness. Capital and gross operating surplus continued to grow, exerting favourable effects on solvency and liquidity risk indicators.

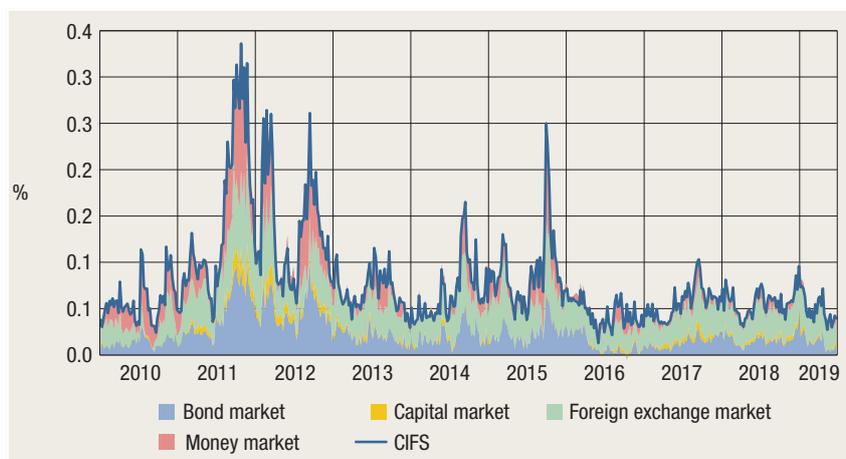
In the first quarter of 2019, the household sector continued to witness an improved interest and currency structure of debt as a result of a drop in the share of loans with a variable interest rate and those indexed to a foreign currency, and a small growth of debt notwithstanding, the household-debt-to disposable income ratio reached the lowest level since the outbreak of the crisis in 2008.

The potential cyclic vulnerability source in the household sector lies in a noticeable growth in general-purpose cash lending of banks to the household sector with a prevalence of non-collateralised loans. Such loans were, already in 2018, granted according to much more lenient creditworthiness assessment standards in comparison with the increasingly stringent lending standards in housing loans. Combined with the increased average initial maturity and amount, this led to an accumulation of credit risk that could materialise in the case of less favourable economic developments. To prevent any associated undesired effects on financial stability and to protect consumers, at the end of February 2019 the Croatian National Bank issued a [Recommendation on actions in granting non-housing consumer loans](#) (for more details see Chapter 3 [Recent macroprudential activities](#)). Data for April and May 2019 point to a further growth in bank loans to households at a similar intensity, with only small changes in their structure: a small slowdown in the growth of general-purpose cash loans following the publication of the Recommendation and a faster growth of housing loans. Total housing loans were 4% higher year-on-year in May 2019 (measured by transactions), which is still a much slower growth rate than the two-digit growth of non-housing cash-loans.

The banking sector remains highly capitalised and liquid and bank exposure to currency and interest rate induced credit risk, although still moderately high, continued to decline due to a further increase in the share of kuna loans and loans with a fixed interest rate in the first quarter of 2019. Very low interest rates on time deposits led to a faster growth of funds in transaction accounts. This, coupled with longer loan maturities, leads to maturity mismatches in the balance sheets of banks. Structural vulnerabilities of the financial sector also reflect high banking market concentration and a concentration of exposures to the government sector and groups of connected persons, which is falling slightly with increased household lending.

The sources of risks arising from current developments in the financial sector have diminished from the [previous report](#) from a low to a very low level (Figure 1), as reflected in favourable developments in the financial stress index for Croatia and the euro area (Figure 2). Although the financial markets suggest that the risk of recession remains relatively high, the trend of yield curve flattening between 10-year and 2-year US bonds came to a halt in May 2019; however the markets are still marked by uncertainties regarding future financial and economic developments.

Figure 2 Croatian index of financial stress and individual markets' contributions



Source: CNB.

Overall, the analysis of system exposure to systemic risks shows that system exposure has remained unchanged from the previous analysis (see [Financial Stability No. 20](#)), and has held steady at a moderate level (Figure 1).

2 Potential triggers for risk materialisation

The analysis of structural vulnerabilities of the domestic economy suggests that potential triggers for risk materialisation in Croatia lie in external developments, most notably the rise in protectionism and a possible greater than expected slowdown in global economic activity. While a final agreement on Brexit is still pending, Italy continues to be marked by great political uncertainty.

Rising protectionism in major global economies has resulted in a further growth in geopolitical uncertainties and a deterioration in economic expectations that may ultimately lead to a slowdown in global economic activity and a decline in the volume of global trade. Such developments might also lead to a deterioration in global financing conditions.

Against the backdrop of the expected slowdown of economic growth in the euro area and the keeping of the inflation target below the level of 2%, the European Central Bank (ECB) continued to pursue an expansionary monetary policy while the USA postponed its monetary tightening. The resulting prolonged period of low interest rates might lead to excessive risk-taking and additionally increase the unfavourable effect of the possible repricing of global risk premia over a medium term.

On account of the further Brexit delay granted by the European Council in April 2019, no final agreement has been achieved, leaving a hard Brexit a possibility. Such a scenario would have a negative impact on economic developments in the countries of the European Union (for more details see [ECB's Financial Stability Review](#)), particularly the countries with strong foreign trade and financial links with the UK and on the conditions of financing on the international markets. Although the direct effects of Brexit on Croatia are estimated as negligible, its indirect effects stemming from the decline in economic growth in other countries of the European Union and increased financing costs on international markets would have an unfavourable impact on macroeconomic and financial developments in Croatia.

Political uncertainty in Italy has risen additionally following European Parliament elections and with new significant risks arising from the inability of the Italian government and the European Commission to reach an agreement about the planned budget for 2019. In the context of the 2019 European Semester, the European Commission issued in June 2019 a Recommendation for a Council Recommendation on the 2019 National Reform and Stability Programme for Italy stating that

due to the general government debt reaching 132% of GDP in 2018 and further expectations of debt growth, it recommends a reopening of the excessive deficit procedure. Italy's CDS soared after parliamentary elections in March 2018 and has since then been highly volatile, holding steady at considerably higher levels than those in peer euro area countries and Central and Eastern European countries. Any considerable decline in the economic activity in Italy could have an unfavourable impact on Croatia since Italy is Croatia's most important trading partner. However, the unfavourable effect of a rise in the price of borrowing on Italian parent banks is not expected to spill over to domestic subsidiaries that are primarily funded by domestic deposits.

As regards the domestic environment, the main sources of risks are not estimated as significant. Nevertheless, if the continuous and fast growth of general-purpose cash lending of banks to households persists, this could lead to an excessive accumulation of credit risk that may materialise in the case of economic activity contraction and a growth in the unemployment rate. Particularly vulnerable are households earning below-average incomes, whose loan repayments, as shown by the Household Finance and Consumption Survey in the majority of households surveyed, exceeded the level that would enable them to dispose of the remaining part of income in the amount or above the minimum amount of living expenses as determined by the Foreclosure Act, thus restricting their borrowing activity in the future (for more details see [Box 1 Indirect limit on the amount of loan repayment relative to debtor's income](#)). As regards non-financial corporations, there are still some uncertainties in connection with Agrokor; these are economic, linked with the future business performance of Agrokor, and also legal, related to the implementation of the settlement.

Other domestic vulnerabilities arise from a potential additional accumulation of arrears in the health sector. In addition, it is not possible to exclude the potential costs of law suits associated with the conversion of loans denominated in Swiss francs and the application of collective agreements in public services. And lastly, the planned further growth in government expenditure to GDP ratio in 2019 (under the Convergence Programme of the Government of the Republic of Croatia) might weigh down on domestic imbalances and impede government ability to adjust in the event of economic activity contraction.

3 Recent macroprudential activities

3.1 Continued application of the countercyclical capital buffer rate for the Republic of Croatia for the third quarter of 2020

A quarterly analytical assessment of the development of cyclical systemic risks has shown that there is still no pressure that would necessitate any corrective interventions on the part of the Croatian National Bank. Specifically, an increase in the stock of total domestic and foreign placements to the household sector and the non-financial sector in the first quarter of 2019 was accompanied by a relatively faster nominal GDP growth, with the result that the standardised relative debt indicator (i.e. total placements to nominal GDP ratio) decreased further. Since this ratio remained below its long-time trend, the credit gap calculated on the basis of this standardised ratio remained negative. A similar trend was also observed in the specific indicator of relative indebtedness, which is the ratio of domestic credit institutions' loans to the seasonally adjusted quarterly GDP. Neither do other important indicators, such as developments in credit growth, growth in real estate prices or current account balance point to risks of excessive credit growth. In line with the results of the analysis, the Croatian National Bank issued in June 2019 the [Announcement of the continued application of the countercyclical capital buffer rate for the Republic of Croatia for the third quarter of 2020.](#)

3.2 Recommendation ESRB/2015/1 on recognising and setting countercyclical buffer rates for exposures to third countries

Pursuant to Recommendation of the ESRB of 11 December 2015 on recognising and setting countercyclical buffer rates for exposures to third countries (ESRB/2015/1), the ESRB has to be submitted in the second quarter of each year a list of material third countries and, if necessary, notified of recognising and setting countercyclical buffer rates for exposures to identified third countries. Deciding on countercyclical buffer rates for third country exposures is also laid down in the Credit Institutions Act.

In line with the predefined analytical framework and schedule as well as the established criteria, at the end of the second quarter of 2018, the CNB reassessed the material exposures of Croatian banks to third

countries, according to data available by the end of 2018. The analysis showed that, as in the previous year, only Bosnia and Herzegovina can be identified as a material third country for the Croatian banking sector. The analytical assessment also shows that, despite further positive growth rates of lending to households and non-financial corporations in Bosnia and Herzegovina, there is still no cyclical pressure requiring regulatory response. In June 2019, the ESRB was notified of the identified material third country.

3.3 Recommendation on actions in granting non-housing consumer loans

At the end of February 2019, the Croatian National Bank issued a [Recommendation on actions in granting non-housing consumer loans](#) recommending credit institutions to take into account minimum costs of living in accordance with the portion of salary exempt from seizure as laid down by the Foreclosure Act when assessing consumer creditworthiness for non-housing loans with initial maturity equal to or exceeding five years (for more details see Box 1). This recommendation aims to level out the conditions for assessing consumer creditworthiness for housing and non-housing loans with longer maturities and thus avoid the possibility of arbitrage between different types of loans. In addition, within its supervisory powers, the CNB asked banks to include in their internal assessments of capital requirements potential losses arising from general-purpose cash loans and to provide in their internal by-laws clear mechanisms for the repayment of banking bonuses in the event of excessive losses arising from such placements.

To assess credit institutions' compliance with the Recommendation and to make adjustments to macroprudential policy instruments where necessary, the Croatian National Bank will require credit institutions to provide all relevant information on loans to consumers. Therefore it has recommended that credit institutions establish unique records of all non-housing consumer loans with information on loan user, loan, type and value of collateral and, for the purpose of monitoring the terms and conditions for granting all consumer housing and non-housing consumer loans, it has recommended credit institutions to establish records on various debt and debt service ratios in relation to the incomes of individual loan users.

Box 1 Indirect limit on the amount of loan repayment relative to debtor's income

Since the beginning of 2018, credit institutions in Croatia have been applying tighter standards for the assessment of creditworthiness when granting housing loans, as the clients cannot be granted a loan greater than the amount that may be repaid from the part of their income eligible for seizure (by the bank or other creditors). To be specific, implementing EBA Guidelines on creditworthiness assessment ([EBA/GL/2015/11](#)) and EBA Guidelines on arrears and foreclosure ([EBA/GL/2015/12](#)) and based on the Act on Consumer Housing Loans, towards the end of 2017, the Croatian National Bank issued the Decision on the additional criteria for the assessment of consumer creditworthiness and on the procedure for the collection of arrears and voluntary foreclosure ([Official Gazette 107/2017](#), hereinafter: Decision). This Decision specifies the requirements for credit risk management of housing consumer loans and prescribes that in the process of granting housing consumer loans, credit institutions are obligated to determine the minimum costs of living that may not be less than the amount of salary exempted from seizure, as defined by the Foreclosure Act.

It should be noted that shortly before that, in mid-2017, amendments to the Foreclosure Act ([Official Gazette 73/2017](#)) were adopted; they provided that the amount of salary exempt from seizure be increased for debtors with a net salary below the average net salary in the Republic of Croatia. These debtors have three-quarters of their net salary exempt from seizure (i.e. they have to be left three-quarters of their net salary at their disposal to cover living expenses), provided that the exempt part does not exceed two-thirds of the average net salary in the Republic of Croatia. For all other debtors the amount of salary exempt from seizure equals two-thirds of the average net salary in the Republic of Croatia (HRK 3,990 in 2017).

Credit institutions have complied with the CNB Decision and the provision that the amounts required for the legally determined minimum costs of living cannot be used for loan repayments. This introduced an indirect limit on the amount of loan repayments for housing loans relative to consumer income since creditworthiness assessment for granting housing consumer loans was aligned with the amount that can be seized in case of default. As a result, from 1 January 2018, the conditions for granting consumer housing loans of credit institutions for debtors in the Republic of Croatia with below average net salary have tightened considerably, as the highest permitted DSTI ratio for these debtors has

been indirectly limited to a maximum of one-fourth of their net salary. For debtors with above average net salary, the part of the salary exempt from seizure is fixed at two-thirds of the average salary in the Republic of Croatia (calculated and published annually by the Central Bureau of Statistics) so the maximum permitted DSTI for such debtors rises as their net salary rises.

The introduction of new standards of housing lending in early 2018 coincided with a fast acceleration in the growth of consumer cash loans the granting of which was subject to more lenient criteria for creditworthiness assessment. The analysis of the conditions for granting cash general-purpose loans to households made by the CNB on a sample of banks towards the end of 2018 suggests that tightened conditions for granting housing loans resulted in a channelling of credit activities to cash loans and that credit institutions tended to grant more expensive and less favourable general-purpose cash loans to consumers who were not creditworthy for a housing loan. This led to an increase in maturity and average amounts of granted general-purpose cash loans and prompted the CNB to respond to the rising credit risk associated with the fast growth in cash loans by issuing the Recommendation on actions in granting non-housing consumer loans. Credit institutions were thus recommended, when determining a consumer's creditworthiness for all non-housing loans to consumers with original maturity equal to or longer than 5 years, to take into account the minimum costs of living in accordance with the part of salary exempt from seizure as prescribed by the Foreclosure Act. The Recommendation aims to level out the conditions for granting longer maturity housing and non-housing loans to consumers and to avoid the possibility of arbitrage (unfavourable for consumers in terms of the price) between different types of loans. Shorter maturity loans (up to 5 years) were not included in the Recommendation since they are considered to be real consumer credits which are generally less risky as they are predominantly loans of smaller amounts than longer-term non-housing loans and it is less likely that the debtor's financial situation will worsen over a shorter period of time.

The exemption of salary from seizure in the amount of minimum costs of living and the limit on the maximum amount of loan repayments relative to debtors' income protect consumers from excessive borrowing and enable the banks to collect their claims in case of foreclosure but at the same time it weighs down on a consumer's ability to take on new loans. In comparison with other EU member states, the implicit limit on the DSTI ratio in the amount of 25% for debtors with a below average income puts Croatia in the group of countries with more restrictive standards. The maximum permitted DSTI ratio in countries that introduced borrower-based measures and explicitly limited the DSTI ratio, generally ranges between 40% and 50%, although some

Table 1 Limits on DSTI ratios for housing loans in EU member states

Country	Limit	Legal basis
Austria	30%–40%	Recommendation
Cyprus*	80% (65% for loans in a foreign currency)	Legally binding measure
Czech Republic	45% (50% for some debtor categories)	Recommendation
Estonia	50% (15% of newly-granted loans may exceed the limit)	Legally binding measure
Hungary	25%–60% (depending on maturity, currency, type of interest rate and income of debtors)	Legally binding measure
Lithuania	40% (up to 5% of newly-granted loans may exceed the limit but up to maximum DSTI ratio of 60%)	Legally binding measure
The Netherlands	10.5%–29.5% (depending on income of debtors and type of interest rate)	Legally binding measure
Poland	40%–50% (depending on income of debtors)	Recommendation
Portugal	50% (up to 20% of newly-granted loans may exceed the limit but up to maximum DSTI ratio of 60%)	Recommendation
Romania	20%–40% (depending on the currency); for buyers of the first real estate property 25%–45% (15% of newly-granted loans may exceed the limit)	Legally binding measure
Slovakia*	80% (for debtors with debt to annual income ratio below 1, DSTI ratio of 100% is allowed)	Legally binding measure
Slovenia	50% up to income level of EUR 1 700; 67% for the part of income over EUR 1 700	Recommendation

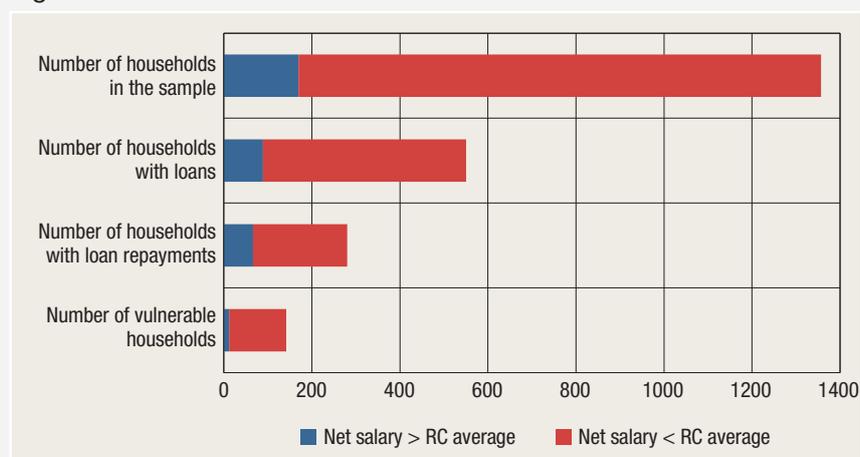
* In Slovakia and Cyprus, the amount of repayments is limited relative to income minus living expenses. As a result, the rate shown is much lower in relation to original debtor income.

Note: In Romania and Slovenia the limits also apply to non-housing consumer loans.

Source: A review of macroprudential policy in the EU in 2018, ESRB, April 2019.

countries allow for certain departures from this ratio for some categories of debtors and loans (Table 1).

The analysis of the findings obtained by the Household Finance and Consumption Survey, conducted in the second half of 2017 with respect

Figure 1 Characteristics of households included in the sample with regard to income level

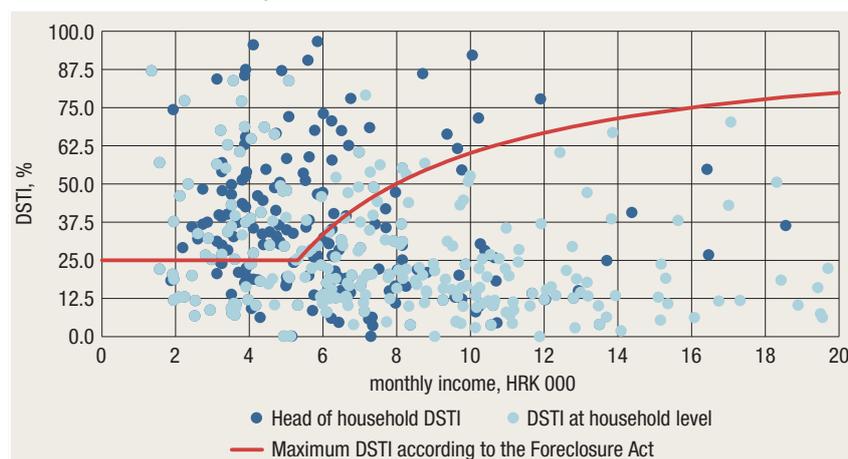
Note: Loans include all loans to the household sector. The difference between the number of households that have loans and households that have loan repayments is mainly due to households that have overdraft loans and credit card loans without regular periodical payments. Vulnerable households are defined as households that have loan repayments and are indebted above the implicit limit based on the ratio of monthly debt service expenses to net salary, as set out in the Foreclosure Act.

Sources: Household Finance and Consumption Survey, CNB calculation and CBS.

to household assets, liabilities, income and consumption in 2016 (that is, before the Foreclosure Act was amended and the CNB Decision entered into force) shows that most of the households included in the sample earn below-average incomes (Figure 1).

Furthermore, almost one half of heads of households with loan repayments in Croatia included in the survey were indebted significantly above the limit defined by the amount of income legally exempt from seizure. This particularly refers to the group of debtors with below-average income, of whom 60%, according to survey findings, are not eligible for any form of new financing by loan under the provisions of the Foreclosure Act of 2017 and the CNB Decision as they had been overburdened by the repayment of existing debt even before the aforementioned regulations entered into force (Figure 2).

Figure 2 Debt service to monthly net income ratio (DSTI) of debtors or households and the implicit limit of the ratio under the Foreclosure Act relative to the monthly net income of debtors



Note: Gross salaries from the Household Finance and Consumption Survey have been converted into net salaries so as to enable their comparison with the part of net salary exempt from seizure under the Foreclosure Act. The average monthly net salary in 2017 was HRK 5,985.

Sources: Household Finance and Consumption Survey (carried out in 2017 with data collected for 2016), CNB calculation and CBS.

The ratio of loan repayment (existing loans) to the income of the head of household (the person earning the highest income in the household) and of the entire household, calculated according to the information on the income and debt of households from the Survey is shown in Figure 2. The orange line shows the implicit limit of the ratio of monthly debt service expenses to net salary set out by the Foreclosure Act. All ratios in Figure 2 above the implicit limit represent heads of households and households that are over-indebted according to applicable regulations and do not have the level of creditworthiness necessary to be granted new loans. Such households are mostly found in income groups with monthly salaries under and around the average, while the share of over-indebted households decreases with higher net salaries.

3.4 Action taken at the recommendation of the European Systemic Risk Board

The European Systemic Risk Board (ESRB) amended and extended its Recommendation on the assessment of cross-border effects of and voluntary reciprocity for macroprudential policy measures ([ESRB/2015/2](#)), recommending the reciprocation of the macroprudential policy measures adopted by the macroprudential authorities of Belgium ([ESRB/2018/5](#)), France ([ESRB/2018/8](#)) and Sweden ([ESRB/2019/1](#)).

In April 2019, Croatia reciprocated the measure adopted by the macroprudential authority of Belgium ([Official Gazette 41/2019](#)), which consists of a risk weight add-on for exposures of credit institutions using the internal ratings-based approach to calculate own funds based on retail loans secured by residential immovable property located in Belgium. Credit institutions that do not exceed the recommended materiality threshold may be exempt from the application of the measure, and the exemption currently applies to all domestic credit institutions. Furthermore, at the request of the macroprudential authority of Estonia, the ESRB recommended that, in relation to the systemic risk buffer for exposures in Estonia (the reciprocity of which was prescribed by the CNB in 2017, [Official Gazette 73/2017](#)), credit institutions apply an institution-specific materiality threshold of EUR 250 million to steer the application of the *de minimis* principle. Accordingly, the CNB amended the previously adopted decision on the reciprocation of the Estonian measure ([Official Gazette 66/2019](#)). The exemption continues to apply to all domestic credit institutions.

Considering the recent increase in the number of recommendations related to the reciprocation of macroprudential policy measures adopted by the macroprudential authorities of other EU member states and the very low exposures of domestic credit institutions to countries adopting the measures, the CNB will be more conservative when recognising the recommended macroprudential measures of other member states in the future. Specifically, the CNB will reciprocate only the recommended macroprudential policy measures of countries to which domestic credit institutions have material exposures (above the materiality threshold prescribed for the application of the *de minimis* principle). Such an approach is in line with the practice of the majority of other EU member states and complies with Recommendation ESRB/2015/2 provided that, once a year, exposures to other countries are reviewed and that relevant measures are reciprocated where the recommended materiality threshold is exceeded. Accordingly, the CNB decided not to reciprocate the macroprudential measures adopted by [Sweden](#) and [France](#).

3.5 Implementation of macroprudential policy in other European Union member states¹

In the first six months of 2019, the macroprudential policy instruments most frequently used by EU member states were the measures to mitigate risks associated with the upward phase of the credit cycle. A non-zero countercyclical capital buffer rate was applied by nine EU countries, with rates ranging from 0.5% to 2%. This includes two countries (Sweden and Norway) that will raise the applicable rate to 2.5% by the end of the year, which is the highest countercyclical capital buffer rate that other EU member states must automatically reciprocate and apply (pursuant to Article 137 of CRD IV, other EU member states may also recognise countercyclical capital buffer rates above 2.5%, but are not obligated to do so). An increase in the rate to be applied in 2020 has also been announced by the Czech Republic, Iceland and Denmark.

By the end of the year, four more countries will begin applying the non-zero countercyclical capital buffer rate, as announced 12 months earlier: Bulgaria (0.5% starting from October 2019 and 1% from April 2020), France (0.25% from July 2019 and 0.50% from April 2020), Ireland (1% from July 2019) and Luxembourg (0.25% from January 2020).

In January 2019, amendments to the regulations on the lending conditions for the household sector were adopted in Romania, according to which the ratio between the borrower's monthly loan repayment expenses and income was limited to 40% for loans in the domestic currency and to 20% for loans denominated in a foreign currency where the borrower is not hedged. For first-time home buyers, the ratios may be 5 percentage points higher, and 15% of newly-granted loans may deviate from the prescribed limits. The measures are applied to all household loans and all credit institutions, non-bank lenders and electronic money issuers.

The Hungarian central bank tightened the existing regulations related to the funding adequacy ratio for housing loans in order to reduce the maturity mismatch arising from the predominantly short-term sources of funding in the domestic currency and the long remaining maturity of housing loans in the domestic currency. The aim of the regulation was to stimulate the issue of domestic-currency mortgage bonds with longer maturities and the secondary mortgage bond market, and the amendments were made to increase the required share of long-term sources of funds.

¹ Source: ESRB (https://www.esrb.europa.eu/national_policy/html/index.en.html) as at 15 June 2019

The Central Bank of Malta adopted the legal basis for borrower-based measures, to be applied as of July 2019. Measures refer to housing loans and include the maximum allowed loan-to-value ratio ranging from 75%-90% for various borrower categories, the maximum allowed debt service-to-income ratio of 40% and a maturity cap of 25 or 40 years, depending on the category of the borrower (requirements are more relaxed for first-time buyers).

Table 1 Overview of macroprudential measures in EU countries

	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IS	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK	
Capital and liquidity buffers																															
CB	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CCB	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G-SII						•			•		•						•					•					•			•	
O-SII	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SRB	•		•		•		•	•		•			•	•		•						•	•	•		•	•		•	•	
Liquidity ratio			•											•									•	•				•			
Caps on prudential ratios																															
DSTI				•	•			•						•							•			•	•	•			•	•	
LTD																													•		
LTI					•										•								•							•	•
LTV				•	•		•	•		•				•	•	•				•	•	•	•	•	•	•	•	•	•	•	•
Loan amortisation																						•	•					•		•	
Loan maturity								•										•				•		•	•	•		•	•	•	
Other measures																															
Pillar II		•		•																		•						•	•		
Risk weights		•							•			•		•									•			•	•	•		•	•
LGD																							•								
Stress/sensitivity test				•	•										•								•				•			•	•
Other	•		•	•	•		•				•		•	•	•						•			•		•	•	•	•	•	•

Note: The measures listed are in line with Regulation (EU) No 575/2013 on prudential requirements for credit institutions and investment firms (CRR) and Directive 2013/36/EU on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (CRD IV). The definitions of abbreviations are provided in the List of Abbreviations at the end of the publication. Green indicates measures that have been added since the last version of the table.

Disclaimer: of which the CNB is aware.

Sources: ESRB, CNB and notifications from central banks and websites of central banks as at 15 June 2019.

For more details see: https://www.esrb.europa.eu/national_policy/html/index.en.html.

Table 2 Implementation of macroprudential policy and overview of macroprudential measures in Croatia

Measure	Primary objective	Year of adoption	Description	Basis for standard measures in Union law	Activation date	Frequency of revisions
Macroprudential measures implemented by the CNB prior to the adoption of CRD IV						
Prior to the adoption of CRD IV, the CNB used various macroprudential policy measures, of which the most significant ones are listed and described in:						
a) Galac, T., and E. Kraft (2011): http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5772						
b) Vujčić, B., and M. Dumičić (2016): https://www.bis.org/publ/bppdf/bispap86l.pdf						
Macroprudential measures envisaged by CRD IV and CRR and implemented by the competent macroprudential authority						
CB	Credit growth and leverage following Recommendation ESRB/2013/1	2014	Early introduction: at 2.5% level	Art. 160(6) CRD	1 Jan. 2014	Discretionary
		2015	Exemption of small and medium-sized investment firms from the capital conservation buffer	Art. 129(2) CRD	17 Jul. 2015	Discretionary
CCB	Credit growth and leverage following Recommendation ESRB/2013/1 and implementing Recommendation ESRB/2014/1	2015	CCB rate set at 0%	Art. 136 CRD	1 Jan. 2016	Quarterly
		2015	Exemption of small and medium-sized investment firms from the counter-cyclical capital buffer	Art. 130(2)	17 Jul. 2015	Discretionary

Measure	Primary objective	Year of adoption	Description	Basis for standard measures in Union law	Activation date	Frequency of revisions
O-SII	Limiting the systemic impact of misaligned incentives with a view to reducing moral hazard following Recommendation ESRB/2013/1	2015	Seven O-SIIs identified by the review of 8 Jan. 2019, with corresponding buffer rates: 2.0% for O-SIIs: Zagrebačka banka d.d., Zagreb, Erste&Steiermärkische Bank d.d. Rijeka, Privredna banka Zagreb d.d., Zagreb, Raiffeisenbank Austria d.d., Zagreb, Addiko Bank d.d., Zagreb, OTP banka Hrvatska d.d. Split; 0.2% for O-SIIs: Hrvatska poštanska banka d.d., Zagreb	Art. 131 CRD	1 Feb. 2016	Annually
		2014	Two SRB rates (1.5% and 3%) applied to two sub-groups of banks (market share < 5%, market share ≥ 5%). Applied to all exposures.	Art. 133 CRD	19 May 2014	Annually
SRB	Credit growth and leverage following Recommendation ESRB/2013/1	2017	The level of two SRB rates (1.5% and 3%) and the application to all exposures have remained unchanged. Decision OG/78/2017 changes the method for determining the two sub-groups to which the SRB is applied. Sub-groups are determined by calculating the indicator of the average three-year share of assets of a credit institution or a group of credit institutions in the total assets of the national financial sector (indicator < 5%, indicator ≥ 5%).	Art. 133 CRD	17 Aug. 2017	On a biannual basis at a minimum
		2014	Maintaining a stricter definition of residential property for preferential risk weighting (e.g. owner cannot have more than two residential properties, exclusion of holiday homes, need for occupation by owner or tenant)	Art. 124, 125 CRR	1 Jan. 2014	Discretionary
Risk weights for exposures secured by mortgages on residential property	Credit growth and leverage following Recommendation ESRB/2013/1	2014	CNB's recommendation issued to banks (not legally binding) on avoiding the use of risk weights of 50% to exposures secured by CRE during low market liquidity	Art. 124, 126 CRR	1 Jan. 2014	Discretionary
Risk weights for exposures secured by mortgages on commercial property	Mitigating and preventing excessive maturity mismatch and market illiquidity following Recommendation ESRB/2013/1	2016	Decision on higher risk weights for exposures secured by mortgages on commercial immovable property. RW set at 100% (substituted CNB's recommendation from 2014, i.e. effectively increased from 50%).	Art. 124, 126 CRR	1 Jul. 2016	Discretionary
		2017	Decision on the additional criteria for the assessment of consumer creditworthiness and on the procedure for the collection of arrears and voluntary foreclosure		1 Jan. 2018	Discretionary
Additional criteria for assessing consumer creditworthiness	Credit risk management in consumer housing loans pursuant to EBA Guideline on creditworthiness assessment (EBA/GL/2015/11) and EBA Guideline on arrears and foreclosure (EBA/GL/2015/12)					
Other measures and policy actions whose effects are of macroprudential use and are implemented by the macroprudential authority						
Consumer protection and awareness	Raising risk awareness and creditworthiness of borrowers following Recommendation ESRB/2011/1	2013	Decision on the content of and the form in which consumers are provided information prior to contracting banking services (banking institutions are obliged to inform clients about details on interest rate changes and foreign currency risks)		1 Jan. 2013	Discretionary
		2013	Amended Decision from 1 Jan. 2013 (credit institutions were also obliged to provide information about the historical oscillation of the currency in which credit is denominated or indexed to against the domestic currency over the past 12 and 60 months)		1 Jul. 2013	Discretionary
Consumer protection and awareness	Raising risk awareness of borrowers following Recommendation ESRB/2011/1 and enhancing price competition in the banking system	2017	The Information list with the offer of loans to consumers, available on the CNB's website, provides a systematic and searchable overview of the conditions under which banks grant loans. With the Information list, standard information available to the consumers are extended with information regarding interest rates		14 Sep. 2017	Discretionary
Structural repo operations		2016	Market operations are aimed at providing banks with longer-term sources of kuna liquidity at an interest rate competitive with interest rates on other banks' kuna liquidity sources, with debt securities of issuers from Croatia to be accepted as collateral		1 Feb. 2016	Discretionary
		2017	The aim of structural operations is to provide banks with longer-term sources of kuna liquidity. The Decision on monetary policy implementation of the Croatian National Bank (OG 94/2017) envisages the use of a pool of eligible assets as collateral for all central bank credit operations, including structural operations, thus opening up the possibility of using short-term securities for long-term CNB operations		20 Sep. 2017	Discretionary
Consumer protection and awareness	Financial stability concerns regarding risk awareness of borrowers	2016	Borrowers are strongly recommended (publicly) by the CNB to carefully analyse the available information and documentation on the products and services offered prior to reaching their final decision, as is customary when concluding any other contract		1 Sep. 2016	Discretionary
Consumer protection and awareness	Mitigation of the interest rate risk in the household sector and the interest-induced credit risk in the banks' portfolios and enhancing the price competition in the banking system	2017	The CNB issued the Recommendation to mitigate interest rate and interest rate-induced credit risk in long-term consumer loans by which credit institutions providing consumer credit services are recommended to extend their range of credit products to fixed-rate loans, while minimising consumer costs		26 Sep. 2017	Discretionary
Mitigating credit risk and raising consumer protection and awareness	Financial stability issues caused by credit risk in the consumer loan portfolios of banks and protection of consumers from excessive debt	2019	The CNB adopted the Recommendation on actions in granting non-housing consumer loans by which all credit institutions providing consumer lending services in the Republic of Croatia are recommended to apply minimum costs of living that may not be less than the amount prescribed by the act governing a part of salary exempted from seizure when determining a consumer's creditworthiness for all non-housing consumer loans with original maturity equal to or longer than 60 months.		28 Feb. 2019	Discretionary
Other measures whose effects are of macroprudential use						
Consumer protection and awareness	Financial stability concerns due to Interest rate risk and currency risk	2013	Amended Consumer Credit Act: fixed and variable parameters defined in interest rate setting, impact of exchange rate appreciation for housing loans limited, upper bound of appreciation set to 20%		1 Dec. 2013	Discretionary
Consumer protection and awareness	Financial stability concerns due to Interest rate risk and currency risk	2014	Amended Consumer Credit Act: banks are obliged to inform their clients about exchange rate and interest rate risks in written form		1 Jan. 2014	Discretionary
Consumer protection and awareness	Financial stability concerns due to currency risk	2015	Amended Consumer Credit Act: freezing the CHF/HRK exchange rate at 6.39		1 Jan. 2015	Discretionary
Consumer protection and awareness	Financial stability concerns due to currency risk	2015	Amended Consumer Credit Act: conversion of CHF loans		1 Sep. 2015	Discretionary
Consumer protection and awareness	Financial stability concerns due to credit risk	2017	Act on Amendments to the Execution Act: increase in the share of income exempt from execution, relating to debtors with below-average net salary		22 Jul. 2017 (1 Sep. 2017)	Discretionary

Measure	Primary objective	Year of adoption	Description	Basis for standard measures in Union law	Activation date	Frequency of revisions
Consumer protection and awareness	Financial stability concerns due to interest rate risk and currency risk	2017	Consumer Home Loan Act: to establish the variable interest rate, the interest rate structure is defined through reference variable parameters and the fixed portion of the rate; for foreign currency consumer home loans, clients were offered one-off conversion of loans, from the currency a loan is denominated in or linked to, to the alternative currency without additional costs		20 Oct. 2017	Discretionary

Note: The definitions of abbreviations are provided in the List of Abbreviations at the end of the publication. Green indicates measures added since the last version of the table.

Source: CNB.

Analytical annex: Financing of high-technology manufacturing firms² in EU countries³

High-technology manufacturing firms have an important role in strengthening a country's competitiveness and are therefore a significant driver of economic growth.⁴ Given their good and less volatile performance, which is less dependent on the economic cycle (like the energy sector or the pharmaceutical industry), such firms contribute to economic stability.⁵ Nevertheless, better business performance than that of firms with lower technology intensity does not mean that high-technology manufacturing firms have access to financing at a lower cost. The reason for this is the uncertainty in the valuation of their business, which makes them vulnerable to changes in the risk premium and places less emphasis on their individual performance. Furthermore,

- 2 The level of technology intensity is defined according to the Organisation for Economic Cooperation and Development (OECD) and the EUROSTAT classification of research and development intensity of individual industries as follows:
 - a) high technology (HT): C21 – manufacture of basic pharmaceutical products and preparations, C26 – manufacture of computer, electronic and optical products
 - b) medium-high technology (MHT): C20 – manufacture of chemicals and chemical products, C27 – manufacture of electrical equipment, C28 – manufacture of machinery and equipment, C29 – manufacture of motor vehicles, trailers and semi-trailers, C30 – manufacture of other transport equipment
 - c) medium-low technology (MLT): C19, C22-C25, C33 – manufacture of coke and refined petroleum products, manufacture of rubber and plastic products, mineral products and metal products, repair and installation of machinery and equipment
 - d) low technology (LT): C10-C18, C31-C32 – manufacture of food products, tobacco products, beverages, textiles and wearing apparel, leather and related products, wood and paper and paper products, printing and reproduction of recorded media, manufacture of furniture and other manufacturing
- 3 The BACH database currently includes non-financial corporations from 11 European Union countries: Austria, Belgium, the Czech Republic, Croatia, Germany, Spain, France, Italy, Luxembourg, Poland, Portugal and Slovakia. In this analytical annex, the data for the period from 2006 to 2017 was used for the aforementioned countries, except Luxembourg.
- 4 The contribution of high-technology and medium-high-technology firms to gross value added in Croatia is relatively modest at 26%, which is noticeably lower than around 72% in Germany, 52% in the Czech Republic and 46% in Belgium.
- 5 <https://articles.marketrealist.com/2014/02/investors-guide-cyclical-counter-cyclical-industries/>

the significantly smaller share of fixed assets and higher expenses also distances high-technology firms from banks.

According to the data available at EU level thus far (see footnote 3), high-technology firms pay higher costs of labour and fixed assets (depreciation), while their borrowing costs do not deviate significantly from other manufacturing firms. Higher costs of labour and fixed assets may be accounted for by the fact that the labour force they employ is highly qualified and the equipment they use is highly specialised, which is reflected in the higher level of technological progress seen in such firms. On the other hand, despite better business performance, and particularly better solvency, these firms do not have lower borrowing costs than other firms in the manufacturing industry (Table 1).

In order to empirically verify the determinants of borrowing costs, an adjusted model developed by Sakai et al. (2010) was used, according to which the financing cost of a firm depends on the country's risk premium, the firm's microindicators and the effects of time and age group. Bearing in mind the specific nature of the database used to obtain performance indicators for firms from various EU countries, shown according to activity, the effects of time and country were used in

Table 1 Higher profitability and solvency of firms with higher technology intensity are not reflected in their borrowing cost

	Firms according to technology intensity			
	Low	Medium low	Medium high	High
Cost characteristics				
Cost of labour (EUR per employee)	38,706	48,972	53,375	65,977
Cost of debt (implicit)	3.5%	3.6%	4.0%	3.6%
Cost of fixed assets (implicit)	12.3%	13.1%	16.9%	18.0%
Average cost	21.3%	22.2%	20.3%	19.6%
Business performance				
Technological progress	0.4%	0.4%	0.7%	0.8%
Return on assets	3.2%	3.0%	3.0%	4.2%
Solvency	8.1	8.2	8.4	10.2
Liquidity	5.3%	5.1%	5.1%	4.6%
Asset turnover	1.2	1.1	1.0	0.7
Other characteristics				
Potential collateral	26.0%	26.0%	15.9%	12.0%
Capital-to-asset ratio	40.5%	38.7%	33.5%	41.6%

Note: The borrowing cost refers to all creditors and is calculated as the ratio of paid interest to the stock of financial debt. The cost of fixed assets is the ratio between depreciation and the stock of fixed assets. The average cost is the ratio of the cost of labour, fixed assets and debt to the total product (measured by income). Technological progress is calculated as the border effect of time on the given production function:

$$\ln y = \ln k + \ln l + \frac{1}{2} t^2 + \frac{1}{2} \ln k^2 + \frac{1}{2} \ln l^2 + \frac{1}{2} \ln k + \ln l + \ln k \cdot t + \ln l \cdot t + \varepsilon$$

where y represents the total production, l the cost of labour, k the cost of fixed assets, and t the time trend. Solvency is the ratio of earnings before interest and interest expenses. Asset turnover is the ratio of sales to total assets. Potential collateral is the share of tangible fixed assets in total assets.

Source: BACH.

this annex, while groups were defined as groups with higher and lower technology intensity. The model used may be shown as follows:

$$\text{Borrowing cost}_{ijt} = \alpha + \beta_1 \text{CDS}_{jt-1} + \beta_2 Y_{ijt-1} + \gamma_j + \delta_t + \varepsilon_{ijt} \quad (1),$$

where CDS is the risk premium of the country where the firm is resident, Y the vector of the microindicator of the firm's business performance in the manufacturing sub-sector i , in country j , in the year $t-1$, while γ_j and δ_t are fixed effects for the country and year.

Results show that (besides time and country effects), the cost of borrowing of manufacturing firms is generally determined by the country's risk premium and their margin and solvency. The risk premium expectedly raises the borrowing cost, but the correlation is more pronounced in firms with higher technology intensity. The margin also increases the cost of borrowing, reflecting the positive correlation between yield and risk, which is more pronounced in firms with lower technology intensity. The solvency of firms predictably lowers the borrowing cost in all groups of firms. As regards other significant determinants, it is important to note that a more intensified bank relationship (measured by the ratio of loans with banks and total liabilities) positively correlates to the borrowing cost in all firms, which is more pronounced in firms that are technologically more advanced. On the other hand, relationships with banks enable firms to save on other bank products (such as payment transactions). Although this may be less significant from the economic point of view, a greater asset turnover in firms with lower technology intensity is linked to lower borrowing costs. At the same time, the analysis does not suggest that lower expenses, aggressive growth (capital expenditures and growth in sales) and liquidity have any significant influence on the cost of borrowing (Table 2).

The stronger correlation between the cost of borrowing and the country's risk premium in firms with higher technology intensity arises from the specific nature of their business process. Developing new technologies is a long process that is frequently perceived as risky by investors, particularly when they lack insight in the process itself. In addition to the fact that the longer investment horizon makes the present value of cash flows sensitive to changes in the discount rate, due to the asymmetry of information, valuers are often forced to take a conservative approach in determining the required yield for such firms. For that reason, significant investments in the research and development of high technology with longer and sometimes uncertain periods of return relativise the effect of the good present solvency of high-technology firms.

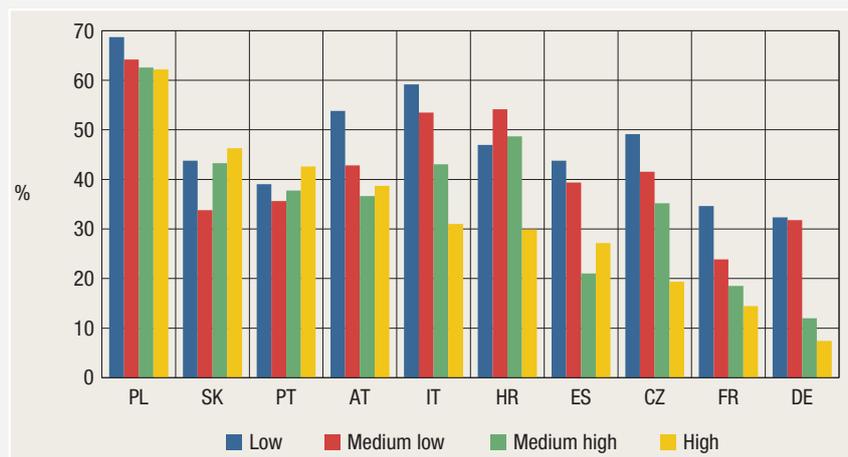
Table 2 Determinants of borrowing costs of EU manufacturing firms

	All firms Coefficient	HT and MHT Coefficient	LT and MLT
Country CDS (macro)	0.091 *** (5.22)	0.101 ** (2.40)	0.085 *** (5.10)
Margin	0.041 *** (3.62)	0.049 * (3.29)	0.057 *** (2.42)
Solvency	-0.055 *** (-7.19)	-0.054 *** (-4.35)	-0.057 *** (-5.94)
Sales growth	0.000 (-0,28)	0.000 (0.13)	0.000 (-0,20)
Capital expenditures	-0.002 (-1,06)	-0.002 (-0,78)	-0.002 (-1,01)
Liquidity	0.014 (1.32)	0.024 (1.27)	0.008 (0.60)
Cost to sales ratio	-0.009 (-1.52)	-0.020 (-1.49)	-0.005 (-0.69)
Asset turnover	-0.002 (-1.67)	0.001 (0.56)	-0.004 ** (-2.88)
Bank relationship	0.015 ** (2.95)	0.028 ** (2.59)	0.011 (1.85)
Fixed effect for the country	Yes	Yes	Yes
Fixed effect for the year	Yes	Yes	Yes
Number of observations	2061	623	1438
R ² – total	0.59	0.59	0.63

Note: Model specification has been made according to Sakai, Uesugi and Watanabe (2010): *Firm age and the evolution of the borrowing cost: Evidence from Japanese small firms*, Journal of Banking and Finance 34 (2010) 1970-1981. Margin is the ratio of net operating profit to total assets. Capital expenditures are the ratio of the sum of amortisation and the change in fixed assets to fixed assets. Liquidity is the ratio of the sum of cash and balances with banks to total assets. Bank relationship is approximated by the share of loans with banks in total liabilities. All regression equations include fixed effects for the given year and country, while independent variables are included with a lag of one year. Robust standard errors are clustered according to sub-sectors and shown in brackets. *, **, *** indicate significance at the level of 10%, 5% and 1% respectively. Extreme indicator values have been moved to the 5th and the 95th percentile of their distribution on an annual basis. The results are robust to a change in the sample of countries. Source: BACH.

The aforementioned specific features of firms with higher technology intensity make it difficult for them to borrow from banks. The international comparison suggests that, as the technology intensity of a firm increases, financing with banks decreases, with the share of banks in all creditors of high-technology firms around 17%. To compare, almost one half of total liabilities to creditors in firms with lower technology intensity are liabilities to banks. Since they own fewer tangible fixed assets, which reflects their orientation towards know-how and larger investments in non-physical forms of assets (such as software, patents, royalties, etc.), firms with higher technology intensity have at their disposal less potential “classic” collateral. Furthermore, considering their specific production process they have a significantly lower asset turnover and lower liquidity, which is why ultimately, when their creditworthiness is determined, they seem less desirable as bank clients due to the lack of “hard” indicators (Figure 1).

Figure 1 EU firms with higher technology intensity use bank services less



Note: The weighted average is shown for all available countries.
Source: BACH.

Although the presented results do not suggest that by increasing borrowing from banks, the cost of debt of firms with higher technology intensity would drop, there remains the question whether banks could additionally diversify their portfolios by expanding their base of clients to such firms. To answer this question, it is necessary to determine what characteristics of firms are important determinants of their relationship with banks. For that purpose, the previously described model was adjusted so that the share of financing with banks depends on: a) macroeconomic conditions, b) firm microindicators and c) effects of country and year. The model used may be shown as follows:

$$\text{Share of banks}_{ijt} = \alpha + \beta_1 X_{jt-1} + \beta_2 Y_{ijt-1} + \gamma_j + \delta_t + \varepsilon_{ijt} \quad (2),$$

where X and Y are vectors of macroindicators or microindicators for country j or firms from the manufacturing sub-sector i , at moment $t-1$, while γ_j and δ_t are fixed effects for the country and year.

Results show that economic growth is negatively correlated to the share of financing with banks, which is particularly pronounced in firms with lower technology intensity. In such firms, the share of financing with banks decreases even as their profitability improves (Table 3). The conservative approach in the use of banking services is also reflected in the negative sign before the growth in sales, which is particularly noticeable in firms with higher technology intensity. As regards microindicators, the “hard” indicators of client creditworthiness are the most significant determinant of financing with banks; this refers to the cost-to-income ratio (in practice often used as an approximation for efficiency), liquidity and the share of tangible fixed assets that are more suitable as collateral. However, due to the specific nature of their business model, firms with higher technology intensity have, in traditional terms, lower efficiency (due to the costlier labour and pricier fixed assets

Table 3 Determinants of the share of financing of EU manufacturing firms with banks

	All firms Coefficient	HT and MHT Coefficient	LT and MLT
Economic growth (macro)	-0.487 *** (-3,17)	-0.202 (-0,79)	-0.520 *** (-2,90)
Bank profitability (macro)	0.004 (0.03)	-0.019 (0.05)	0.008 (0.03)
Operating profitability	-0.107 (0.11)	0.165 (0.12)	-0.286 * (0.16)
Sales growth	-0.027 * (0.02)	-0.064 ** (0.03)	-0.012 (0.02)
Liquidity	0.629 *** (0.22)	0.166 (0.27)	0.894 *** (0.30)
Asset turnover	0.024 (0.03)	0.004 (0.04)	0.005 (0.03)
Cost to sales ratio	-0.302 ** (0.12)	-0.630 *** (0.22)	-0.246 * (0.13)
Potential collateral	0.190 ** (0.08)	-0.120 (0.15)	0.240 *** (0.08)
Capital to asset ratio	0.080 (0.07)	0.002 (0.09)	0.111 (0.08)
Fixed effect for the country	Yes	Yes	Yes
Fixed effect for the year	Yes	Yes	Yes
Number of observations	2061	623	1438
R ² – total	0.44	0.58	0.44

Note: The share of financing with banks is the ratio between debt to banks and debt to all creditors. Economic growth is the real annual GDP growth. Bank profitability is the ROE of the entire sector in a particular country. Operating profitability is the ratio of EBITDA to sales. All regression equations include fixed effects for the given year and country, while independent variables are included with a lag of one year. Robust standard errors are clustered according to sub-sectors and shown in brackets. *, **, *** indicate significance at the level of 10%, 5% and 1% respectively. Extreme indicator values have been moved to the 5th and the 95th percentile of their distribution on an annual basis. The results are robust to a change in the sample of countries.

Source: BACH.

they use), lower liquidity, and, finally, less eligible collateral (due to the fact that they more frequently rent than buy fixed assets, particularly real estate, and the fact that they invest in intangible forms of fixed assets).

To conclude, the borrowing cost of firms with higher technology intensity is higher than what would be expected based on their good performance indicators due to the specific nature of their business process which makes them vulnerable to changes in the risk premium and relativises their good solvency. Although no evidence was found that financing with banks would lead to lower total borrowing costs for such firms, their inclusion in the banks' loan portfolios could have favourable effects on portfolio diversification. Even though such firms seem riskier from the aspect of traditional banking, by discriminating against them, banks are missing the opportunity to attract potentially good clients that, as a

result, turn to venture capital funds, angel investors and crowdfunding platforms.

In order to stimulate the operation of firms with higher technology intensity, which are expected to contribute the most to development, some EU countries offer support through various economic policy measures, e. g. tax measures (tax credits, research and development tax incentives, options of hyper-accelerated amortisation, tax stimuli for patents, etc.), government investment co-financing, interest subsidies or government guarantees for loans, ensuring a legal framework for securitisation, etc. In that way, they reduce the cost of financing of firms with higher technology intensity and support investment and economic activity.

Glossary

Financial stability is characterised by the smooth and efficient functioning of the entire financial system with regard to the financial resource allocation process, risk assessment and management, payments execution, resilience of the financial system to sudden shocks and its contribution to sustainable long-term economic growth.

Systemic risk is defined as the risk of an event that might, through various channels, disrupt the provision of financial services or result in a surge in their prices, as well as jeopardise the smooth functioning of a larger part of the financial system, thus negatively affecting real economic activity.

Vulnerability, within the context of financial stability, refers to structural characteristics or weaknesses of the domestic economy that may either make it less resilient to possible shocks or intensify the negative consequences of such shocks. This publication analyses *risks* related to events or developments that, if materialised, may result in the disruption of financial stability. For instance, due to the high ratios of public and external debt to GDP and the high demand for debt (re)financing, Croatia is very vulnerable to possible changes in financial conditions and is exposed to interest rate and exchange rate change risks.

Macroprudential policy measures imply the use of economic policy instruments that, depending on the specific features of risk and the characteristics of its materialisation, may be standard macroprudential policy measures. In addition, monetary, microprudential, fiscal and other policy measures may also be used for macroprudential purposes, if necessary. Because the evolution of systemic risk and its consequences, despite certain regularities, may be difficult to predict in all of their manifestations, the successful safeguarding of financial stability requires not only cross-institutional cooperation within the field of their coordination but also the development of additional measures and approaches, when needed.

List of abbreviations

Art.	Article
bn	billion
b.p.	basis points
CB	capital conservation buffer
CCB	countercyclical capital buffer
CEE	Central and Eastern European
CHF	Swiss franc
CNB	Croatian National Bank
CRD IV	Directive 2013/36/EU on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms
CRR	Regulation (EU) No 575/2013 on prudential requirements for credit institutions and investment firms
d.d.	dioničko društvo (joint stock company)
DSTI	debt-service-to-income ratio
EBA	European Banking Authority
EBITDA	earnings before interest, taxes, depreciation and amortisation
ECB	European Central Bank
ESRB	European Systemic Risk Board
EU	European Union
Fed	Federal Reserve System
FINA	Financial Agency
FOMC	Federal Open Market Committee
GDP	gross domestic product
G-SII	global systemically important institutions buffer
HANFA	Croatian Financial Services Supervisory Agency
HRK	Croatian kuna
IRB	internal ratings-based
LGD	loss-given-default
LTD	loan-to-deposit ratio
LTI	loan-to-income ratio
LTV	loan-to-value ratio
NBB	National Bank of Belgium
no.	number
OG	Official Gazette
O-SII	other systemically important institutions buffer
O-SIIs	other systemically important institutions
Q	quarter
SRB	systemic risk buffer

Two-letter country codes

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland
IS	Iceland
IT	Italy
LV	Latvia
LT	Lithuania
LU	Luxembourg
MT	Malta
NL	The Netherlands
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

