

Bykova, Alexandra; Pindyuk, Olga

Research Report

Non-Performing Loans in Central and Southeast Europe

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Policy Notes and Reports 32

Non-Performing Loans in Central and Southeast Europe

Alexandra Bykova and Olga Pindyuk



The Vienna Institute for International Economic Studies
Wiener Institut für Internationale Wirtschaftsvergleiche

Non-Performing Loans in Central and Southeast Europe

ALEXANDRA BYKOVA
OLGA PINDYUK

Alexandra Bykova and Olga Pindyuk are Economists at the Vienna Institute for International Economic Studies (wiiw).

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Abstract

Exploring the determinants of credit risk has gained importance in the aftermath of the global financial crisis, which caused a sharp increase in non-performing loans (NPLs) in Central, East and Southeast Europe. In this note we first analyse the post-crisis trends in NPLs comparing five Southeast European countries with their peers in Central and Eastern Europe. Second, we estimate the effect of key macroeconomic drivers on NPL development in the region. We distinguish between total household loans, non-secured consumer loans, housing loans and loans to non-financial corporations, and investigate separately their corresponding determinants.

On average across the five Southeast European countries examined (Bosnia and Herzegovina, Croatia, Montenegro, Serbia, and Slovenia), after the crisis asset quality of corporate loans deteriorated more strongly than that of household loans. We find that GDP growth has a negative and statistically significant impact on NPLs for all types of loans. However, the impact on corporate loan quality is much greater than for households, and in particular for consumer loans (housing loans' NPLs show a stronger negative relationship with GDP growth). We therefore conclude that the consumer loan quality is less susceptible to the business cycle than either corporate or housing lending. One possible explanation for this is that the amounts involved are smaller, and can often be serviced in times of difficulty by friends or relatives. This probably included relatives living abroad, given that outward migration from the Western Balkans is so high, and remittances inflows so large.

We find that various other macroeconomic indicators have an impact on asset quality. Rises in consumer and producer price inflation are associated with higher NPL ratios for all types of loans, but changes in real interest rates affect corporates more than households. This may be because corporates have a greater share of floating rate loans. Interestingly, higher unemployment also appears to affect corporate asset quality more strongly than that of households: this may again be related to the possibility of friends or relatives helping out with loan repayments for smaller consumer loans. Finally, we also find that periods of elevated loan growth are followed eventually by higher NPL levels.

Based on our analysis, we recommend the following policy priorities for banking sectors in CESEE:

- › Development of early warning systems to monitor the risks of credit portfolio deterioration and anticipate the build-up of future NPL problems.
- › Better frameworks for bad loan resolution in some countries, especially in relation to corporates, where in some cases NPLs still remain high long after the crisis.
- › Engaging with the Vienna Initiative on promoting cross-border regulatory framework and NPL resolution mechanisms.

Keywords: Southeast Europe, non-performing loans, credit cycle, financial crisis, unsecured household loans

JEL classification: JEL classification: G01, G21

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ABBREVIATIONS

BA	Bosnia and Herzegovina
BG	Bulgaria
CZ	Czech Republic
EE	Estonia
HR	Croatia
HU	Hungary
LT	Lithuania
LV	Latvia
ME	Montenegro
PL	Poland
RO	Romania
RS	Serbia
SI	Slovenia
CHF	Swiss franc
EUR	euro
RSD	Serbian dinar
USD	US dollar
CBBH	Central Bank of Bosnia and Herzegovina
CBCG	Central Bank of Montenegro
CEE	Central and Eastern Europe
CESEE	Central, East and Southeast Europe
CPI	consumer price index
EBA	European Banking Authority
EU	European Union
FCMC	Financial and Capital Market Commission of Latvia
FSR	Financial Stability Report
GDP	Gross Domestic Product
FINREP	financial reporting
HH	households
NB	National Bank
NFC	non-financial corporation
NPE	non-performing exposure
NPL	non-performing loan
PPI	producer price index
PPP	purchasing power parity
RER	real exchange rate
RIR	real interest rate
SEE	Southeast Europe
SME	small and medium-sized enterprise
wiiw	The Vienna Institute for International Economic Studies
.	not available (in tables)
pp	percentage points

Non-Performing Loans in Central and Southeast Europe

1. INTRODUCTION

The global financial crisis caused a sharp deterioration of bank asset quality in Central, East and Southeast Europe (CESEE). High levels of non-performing loans (NPLs) paralysed the banking sector and necessitated a substantial cleansing of banks' balance sheets. Banks became more risk averse and wary of issuing new loans, which contributed to suppressing investment and consumption in ailing economies and made their recovery more protracted.

Exploring the determinants of credit risk has gained importance both to regulatory authorities concerned with financial stability and for banks' managements. A better understanding of the key drivers behind credit risk enables regulators to set up rules and policies in order to minimise the negative effects of economic downturns on the banking system. Bank managers could also benefit from a better grasp of the forces behind credit risk proliferation and adjust their lending practices in a timely manner.

When analysing NPLs it is important to look separately at different loan categories, rather than the aggregate level of NPLs. The credit risk of different types of loans can fluctuate through various channels, and macroeconomic variables may impact each type of NPL in a different way. Differences in the sensitivity of various NPL categories to macroeconomic developments may be related to differential effects of the business cycle on agents' cash flows and collateralised assets' values.

In this note we are primarily interested to see whether certain categories of loans are less impacted by macroeconomic downturns than others. In particular, we want to check whether corporate loan quality in the region is more susceptible to economic crises than household credit, and whether smaller non-financial corporations are less impacted compared to larger ones. Within the household segment, we want to test the hypothesis that in CESEE NPLs in the sector of unsecured household loans have a weaker reaction to economic downturns as compared with secured (mortgage) ones. Our hypothesis is that this could be the case due to the size difference (funds to service smaller consumer cash loan amounts can still be borrowed from family and friends) and different degrees of foreign currency indexation.

This note is organised as follows. First, we analyse the post-crisis trends in NPLs in five Southeast European (SEE) countries – Bosnia and Herzegovina, Croatia, Montenegro, Serbia, and Slovenia. We compare them with countries in Central and Eastern Europe (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia). Second, we use existing methodologies of empirical analysis to explore the key macroeconomic drivers of NPL developments in CESEE, and in particular the SEE countries. We distinguish between total household loans, non-secured consumer loans, housing loans and loans to non-financial corporations, and investigate separately their corresponding determinants. Finally, we present conclusions and policy recommendations.

2. LOANS QUALITY ASSESSMENT BY TYPE OF LOANS

In the five Southeast European (SEE) countries considered here – Bosnia and Herzegovina, Croatia, Montenegro, Serbia, and Slovenia – the share of non-performing loans (NPLs) in total loans remained high in 3Q 2018, exceeding (on average) the average value for countries from Central and Eastern Europe (CEE) (Table 1). Across the joint sample of countries from CESEE, the household client segment (HH) has in general a lower level of bad loans ratios compared with non-financial corporations (NFCs), and the difference is particularly big in SEE. The small and medium-sized enterprises (SME) sub-segment demonstrated a worse performance in terms of NPLs as compared with non-financial corporations in all the countries for which data are available.¹

Table 1 / NPL share in total loans by type of loans in 3Q 2018, in %

	Total	Non-financial corporations	Households	General purpose consumer loans	Housing loans	SME
SEE countries	7.5	11.6	5.5	4.9	5.5	11.5
Bosnia and Herzegovina	9.4	11.4	7.1	6.5	8.5	.
Croatia	10.3	20.5	7.3	5.9	5.5	.
Montenegro	6.7	11.2	5.8	.	.	.
Serbia	6.4	5.4	4.2	3.7	5.5	.
Slovenia	4.5	9.6	2.8	3.3	2.5	11.5
CEE peer countries	4.9	7.3	5.0	6.5	4.0	10.3
Bulgaria	8.7	15.2	9.4	9.0	9.2	.
Czech Republic	3.3	6.6	2.3	4.7	1.7	.
Estonia	0.6	0.9	0.6	1.3	0.4	.
Hungary	6.5	6.4	10.7	10.9	10.6	.
Latvia	6.0	10.2	5.4	4.4	4.9	.
Lithuania	2.7	4.1	2.8	2.9	1.9	8.6
Poland	7.0	9.0	6.0	11.1	2.5	11.3
Romania	5.6	9.5	4.8	5.0	2.8	11.1
Slovakia	3.4	4.3	3.1	9.2	1.7	.

high NPL ratios

low NPL ratios

Note: Regional data represent simple averages over available countries. Data for Slovenia are for non-performing exposures (NPE). For Lithuania the household NPL ratio is calculated as a weighted average between consumer and housing loans. For Poland the total NPL ratio is calculated using only household and non-financial corporation data. Housing loans for Hungary are household loans collateralised by residential immovable property; consumer loans represent the difference between household and housing loans. National definitions of NPLs and methodological breaks in time series are documented in the explanatory notes in the Appendix.

Sources: Central bank statistics, wiiw calculations.

The credit portfolio quality of different types of loans to households (general purpose versus housing loans) is heterogeneous. The NPL ratio for housing loans exceeds that for general purpose consumer loans by around 2 percentage points in Bosnia and Herzegovina and Serbia, and only by less than 0.5 percentage points in Bulgaria and Latvia. For other countries, the general purpose consumer loans' NPL ratio surpasses the NPL ratio for housing loans but to a different degree. In Poland and Slovakia

¹ It is important to mention that micro enterprises, though belonging to the SME category, can exhibit different credit behaviour. Micro enterprises are often household-firms, thus their credit behaviour can resemble that of households, meaning that in case of emergency the owners of micro firms can restrict consumption or forego wages to avoid defaulting on their loans.

the differential is rather high – 8.6 percentage points and 7.5 percentage points, respectively. For Croatia, Estonia, Hungary, and Slovenia the difference for NPL ratios between consumer and housing loans is less than one percentage point.

Comparing NPL ratios for general purpose loans with average household client segment values we observe heterogeneous performance across countries. In the SEE region, NPL ratios for general purpose loans were lower than for total household loans in most countries; only in Slovenia was the situation the opposite. In contrast, in all the CEE countries in our sample, NPL ratios for general purpose consumer loans were higher than average NPL ratios for total household loans. Poland and Slovakia had the highest differential at more than 5 percentage points, followed by the Czech Republic with a 2.5 percentage point differential. In Estonia, Hungary, Lithuania and Romania the difference was rather small.

In Croatia, Bulgaria and Latvia other types of loans to households are more risky. It is worth keeping in mind that national breakdowns by type of loans for households vary substantially among countries, which restricts cross-country data comparability.

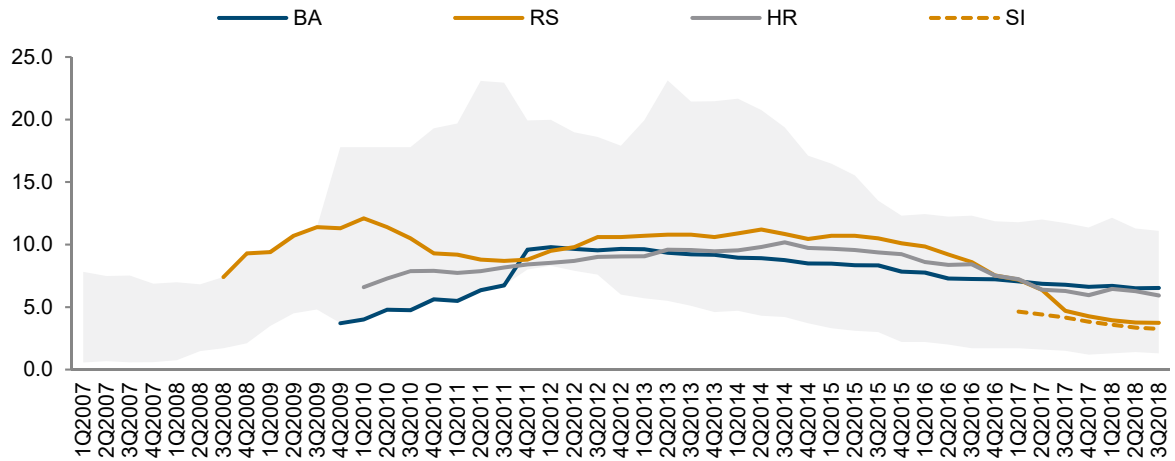
Not only the level of NPLs but also the sensitivity of credit quality to macroeconomic downturns is rather country specific and will be described in the sections below for the five SEE countries.

The global financial crisis prompted an increase in both the ratio of NPLs at the country level and the differences between countries' NPL levels. For the sample of CESEE countries for which time series for NPLs to household loans for consumption are available², the grey area of Figure 1 reflects the range from minimum to maximum NPL ratios. Among the SEE countries, only data for Serbia are available back to the global financial crisis period and its immediate aftermath. As Figure 1 shows, the quality of consumer loans in Serbia saw a deterioration in 2008-2009, albeit still slightly below the regional maximum level. Along with the main determinants of NPLs, which will be discussed in Chapter 3, in the case of Serbia large exposure to foreign currency lending had an incremental impact on the deterioration of loan quality in response to the depreciation of the Serbian dinar against the euro in 2009³. For other SEE countries with the euro as their national currency, a pegged to the euro or fixed exchange rate, risks were mostly limited to euro fluctuations against other major currencies. Box A.1 in the Appendix describes as an example the effects of Swiss franc appreciation against the euro on loan quality worsening for each country in the SEE region.

The cross-regional comparison between SEE countries and CEE countries depicts a lower sensitivity of NPL ratios to the business cycle in the SEE region for consumer loans in particular and generally for the HH segment loans (Figure 2). The dispersion of NPL ratios for consumer loans is higher in the CEE region in both cases but is even more pronounced for consumer loans.

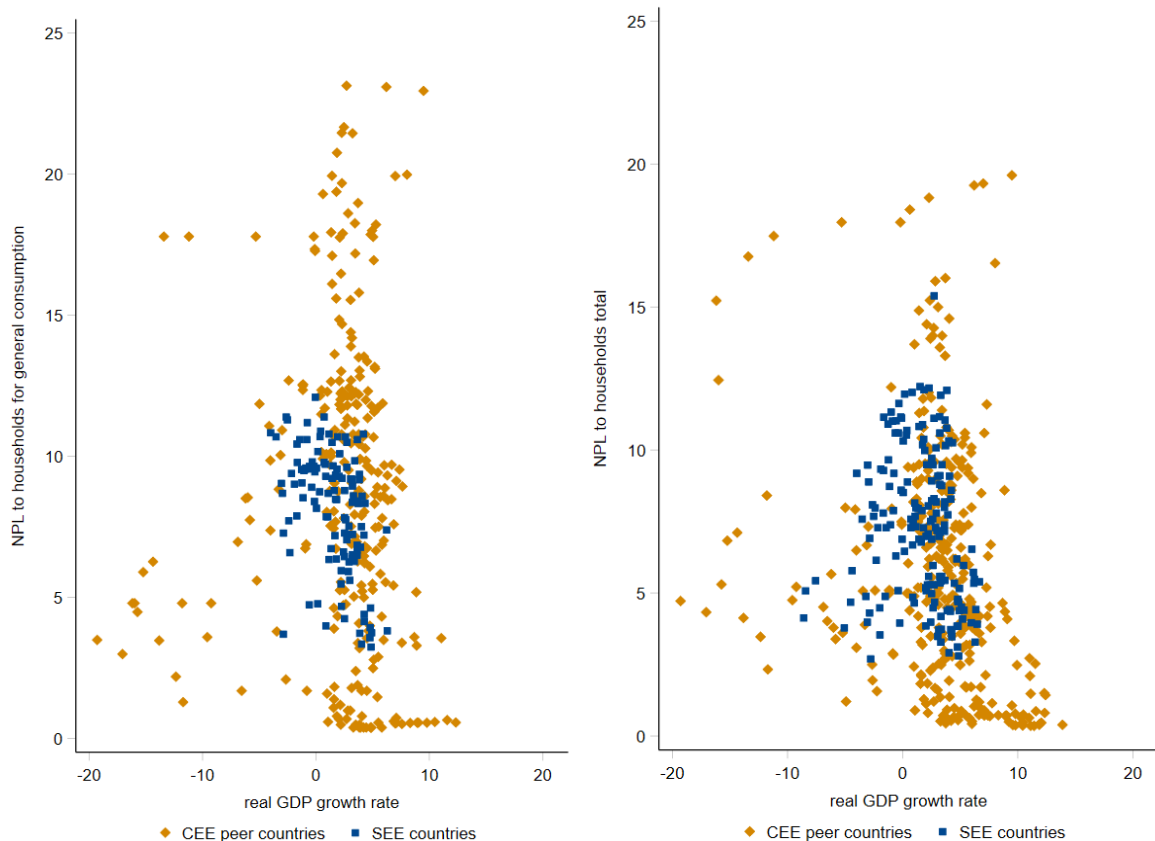
² Data availability is documented in the explanatory notes in the Appendix.

³ The correlation coefficient between the lagged changes in the exchange rate of the Serbian dinar to the euro, weighted by the share of foreign currency loans, and changes in NPL ratios for household loans, calculated with quarterly data on the average exchange rate, was positive and amounted to 0.5 in 2009-2010 but was only 0.1 in the period 2009-2018, which implies a diminishing impact over a longer period. For the calculations we used the approach proposed by Jakubik and Reininger (2013).

Figure 1 / Cross-country comparison of consumer loans' NPL ratios, in %

Note: The grey shadow shows the range of NPL ratios across the countries in our sample; its borders denote the highest and the lowest values of NPL across countries for a given quarter.

Sources: Central bank statistics, wiiw calculations.

Figure 2 / Sensitivity of NPL ratios to the business cycle by regions

Note: Available quarterly data for 2000-2018 for individual countries.

Sources: Central bank statistics, wiiw calculations.

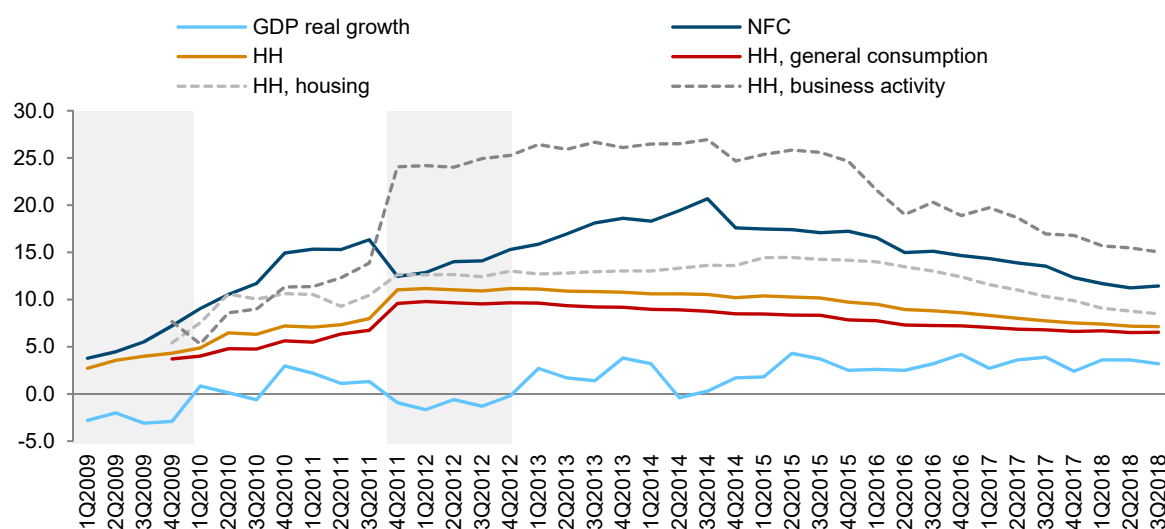
2.1. Non-performing loans in Bosnia and Herzegovina

The economy of Bosnia and Herzegovina experienced two economic downturn periods over 2009-2018. First, in 2009 after the global financial crisis, when real GDP declined by 3%. Second, a shallower downturn in 2012 when real GDP contracted by 0.8%. These recessions were accompanied by a broader industrial production decline, unfavourable external conditions for aluminium and steel exporters (low prices), a fall in real wages, higher unemployment, and a lack of investment (see wiiw, 2012). These adverse economic developments naturally led to a rise in NPLs.

By contrast, in the last four years Bosnia and Herzegovina has experienced growth above 3%, gradually implementing reforms and adjusting legislation to boost competitiveness, attract investment and create jobs in the private sector, supported by an IMF three-year USD 608 million loan under the Extended Fund Facility from 2016⁴. These more positive economic trends have seen NPLs fall.

In Bosnia and Herzegovina the ratio of NPLs to the NFC sector have been in general higher than the NPL ratio for the HH sector over the past decade. Starting from an almost identical level in 1Q 2009 of 3.8% for NFCs and 2.7% for HH, the credit quality deterioration affected the NFC segment to a substantially larger extent during the economic crisis with a steeper growth of NPLs up to 4Q 2011 by 12.6 percentage points (Figure 3).

Figure 3 / NPL ratio by type of loans in comparison to GDP growth in Bosnia and Herzegovina, 2009-2018, in %



Note: Periods with negative real GDP growth rates are highlighted in grey.

Sources: Central Bank of Bosnia and Herzegovina, based on data by the Banking Agency of the Federation of Bosnia and Herzegovina and the Banking Agency of Republika Srpska; Agency for Statistics of Bosnia and Herzegovina.

During the GDP decline in 2012, NFC NPLs were again more sensitive to the macroeconomic downturn, the reaction was lagged and the decrease of NPLs started only at the end of 2014. The loans to households for business activities were hit the strongest by the economic crisis with a sharp increase of NPLs from 7.7% in 4Q 2009 to 24.2% in 1Q 2012.

⁴ <https://www.imf.org/en/News/Articles/2016/09/06/NA090916BosniaandHerzegovina>

Since 2013 NPL ratios have been declining for all categories of loans as a result of restructuring efforts of banks and backed by favourable macroeconomic conditions, with GDP growth of 2.7% on average over the period. A more gradual path of NPL reduction is observed for consumer loans and household segment loans in general whereas NPLs for NFCs, housing and business activities experienced a steeper decline but still at higher levels.

At present, loans for general consumption have the lowest NPL ratio of 6.5% out of all segments.

In 3Q 2018 consumer loans accounted for more than 75% of the total HH loan stock, thus determining the quality of the overall HH credit portfolio. Loans for various housing expenses represented almost 20% and for investment around 2% of all household loans.

The NPL reduction was achieved mostly by write-off and rescheduling of bad loans and better risk-management practices in the banks. In 2017, a substantial decrease of NPLs for the category of HH housing was largely due to the restructuring of operations in several banks. A recovery of NFC credit activity as well as lower interest rates and overall good economic performance contributed to the NPL reduction in the corporate sector (CBBH, 2017).

2.2. Non-performing loans in Croatia

The Croatian economy was severely hit by the 2008 global financial crisis, and experienced negative real GDP growth rates for six consecutive years. Until 2013, industrial performance was poor due to low competitiveness and lack of investment. An especially deep contraction in output was recorded in the construction sector, amounting to a cumulative decline of around 43% over the 2009-2013 period. Labour markets were also depressed, and the unemployment rate rose by almost 9 percentage points to 17% during the post-crisis downturn period (see wiiw, 2014). After EU accession in 2013, followed by fiscal consolidation and deleveraging, the Croatian economy started recovering, and from 2015 onwards it grew by almost 3% on average.

With the longest period of economic crisis among the SEE countries analysed, the quality of Croatian loans also deteriorated for more than five years in a row. NPLs for NFCs were much more sensitive to the poor economic conditions than HH client segment NPLs on average (Figure 4).

A very detailed national breakdown of HH loans by various types of loans shows a substantial variety of developments.

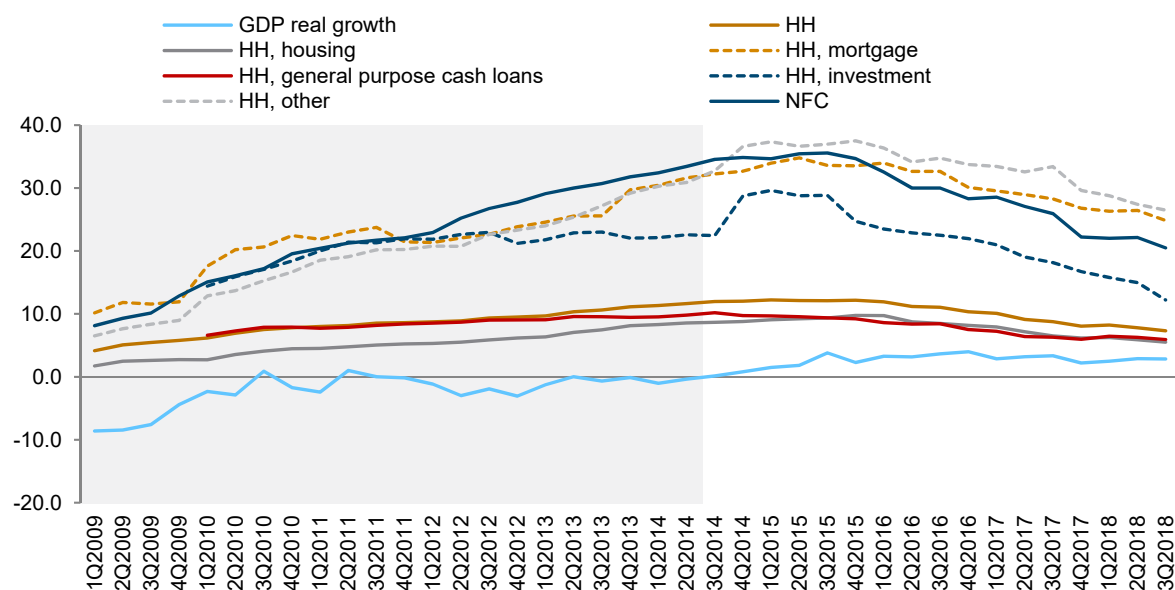
Among economic sectors, construction was hit dramatically by the crisis with NPLs starting from an already high level of 17.8% in 1Q 2010 and achieving their maximum value of an exorbitant 67.2% in 4Q 2015.

While housing loans, with a low initial starting level of NPL ratios of 2.7% in 1Q 2010, constantly increased and reached a maximum ratio of 9.8% in 4Q 2015, consumer loans with already high initial ratios of NPLs of 6.6% deteriorated slowly with a 3.6 percentage points rise and started to improve earlier in 3Q 2014.

The HH loans sub-categories 'investment', 'mortgage' and 'other' showed the strongest response to the economic downturn, accumulating respectively 15.6, 24.6 and 31 percentage points increases in NPL ratios from 2009 (or first available data point) to their maximum levels. The category 'mortgage loan' is defined by the Croatian National Bank as a non-purpose credit (the purpose is unknown) granted by a credit institution to customers on the basis of a pledge on real estate and its repayment is secured by a real coverage (a residential or business space, land, a farm and the like) and thus the security of the loan repayment does not arise from the debtor's creditworthiness but from the value of the property. As all these categories together represent now less than 10% of the total stock of loans to households, their bad performance does not affect much the total HH segment NPL ratio.

The NPL decline for all categories of loans since 2015 reflects NPL resolution by banks both through write-off and active selling of distressed debt on the market.

Figure 4 / NPL ratio by type of loans in comparison to GDP growth in Croatia, 2009-2018, in %



Note: Periods with negative real GDP growth rates are highlighted in grey.

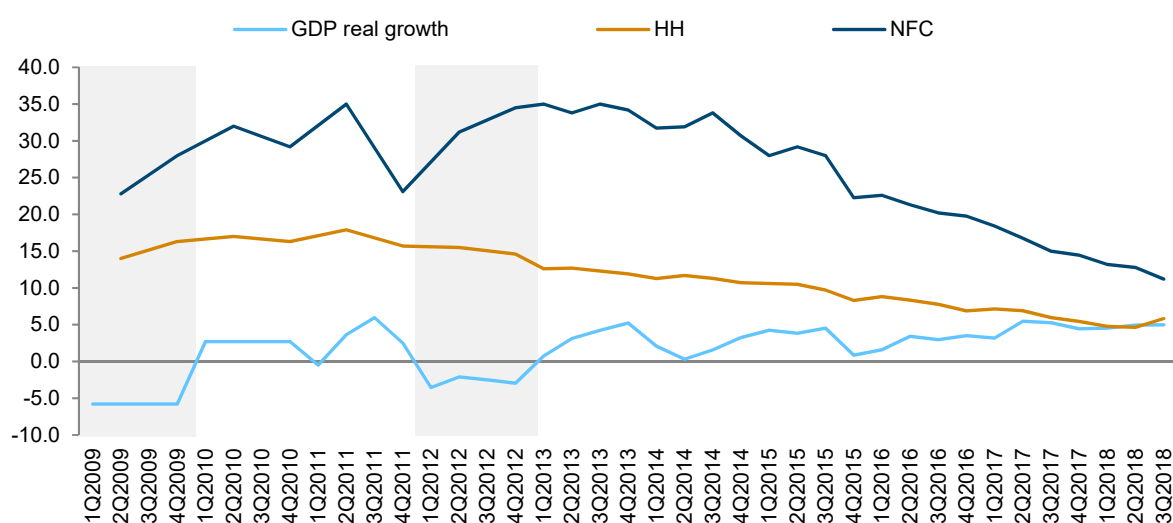
Sources: Croatian National Bank, Eurostat.

2.3. Non-performing loans in Montenegro

Montenegro experienced two periods of economic downturn – in 2009, with real GDP contraction by 5.8%, and – as other Western Balkan economies – again in 2012, with a 2.7% real GDP drop after a short period of fragile recovery in 2010-2011. The credit quality in the NFC sector remained much lower than that for HH over the whole period and reacted more strongly to both economic downturns. By the end of 3Q 2018 the volume of NPLs to NFCs still represents around two third of all NPL stocks, although the HH and NFC segments have an almost equal share in the total stock of loans to the non-financial private sector. Among economic sectors, construction as well as wholesale and retail trade accumulated 16% of the total NPL stock each by the end of the third quarter of 2018.

The NPL ratios to HHs continued to fall even after the short period of negative GDP growth in 2012 (Figure 5). The change in the definition of NPLs to a narrower one from 2013 onward (until 2012 loans with more than 30 days overdue, thereafter more than 90 days overdue) did not affect the general trends.

Figure 5 / NPL ratio by type of loans in comparison to GDP growth in Montenegro, 2009-2018, in %



Note: Periods with negative real GDP growth rates are highlighted in grey.

Sources: Central Bank of Montenegro, Statistical Office of Montenegro.

2.4. Non-performing loans in Serbia

Serbia experienced three full-year real GDP contractions over 2009-2018 (-2.7% in 2009, -0.7% in 2012 and -1.6% in 2014). Apart from systemic problems such as poor labour market conditions, inefficient state-owned enterprises dominating the economy, high indebtedness and poor public sector performance, Serbia was also hit by natural disasters such as a drought in 2012 and floods in 2014. In 2012, agricultural production declined by 19.5% and in 2014, industrial production and especially the energy sector suffered from the consequences of floods (with industrial production declining by 7.3% in 2014). In the period 2015-2018 Serbia participated in an IMF structural reforms programme worth USD 1.2 billion, aimed at broad economic reforms to improve institutions, public services, the labour market, the financial system, infrastructure and the business climate.⁵ Over this time period, real GDP growth averaged almost 3%.

The high share of foreign currency (or foreign currency indexed) loans in Serbia, which fluctuated at a level of around 70% during the 2009-2018 period, makes loan performance vulnerable to exchange rate volatility. In the case of Serbia, an analysis of loan quality sensitivity should account for the currency breakdown. Currently, exchange rate fluctuations are more relevant for NFCs, with 85% of credits denominated in or indexed to foreign currency (data available only starting from 2012). Credits in

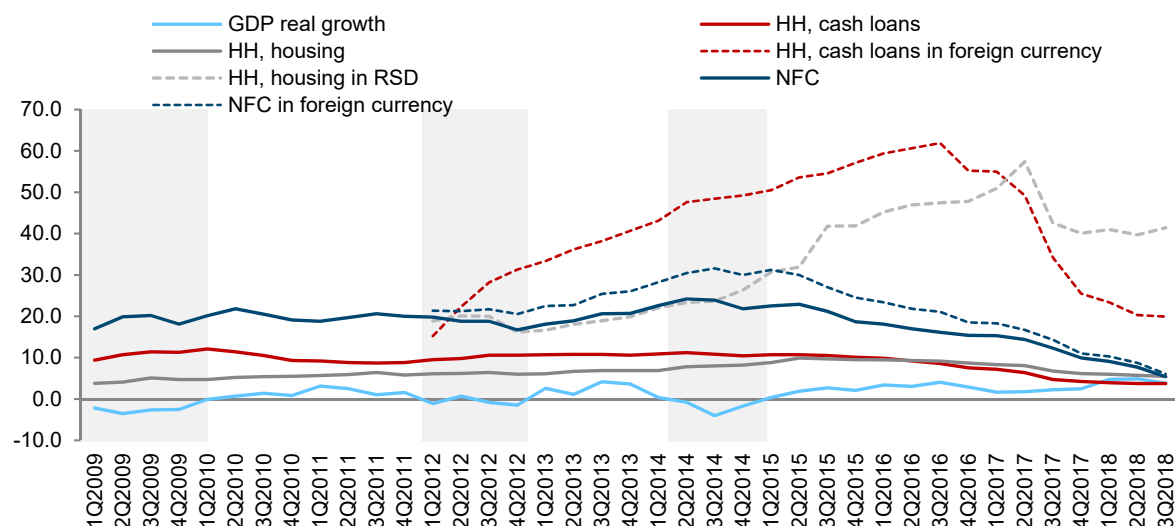
⁵ <https://www.imf.org/en/News/Articles/2018/02/21/na022218-serbia-completes-successful-imf-program>

national currency now represent 56% of household loans, which means a reduced risk in comparison with 2008 when their share was only 24%.

Serbian NPL statistics provide for a very detailed breakdown of HH loans by purpose. This analysis will concentrate on cash and housing loans, which together represent 70-80% of all HH loans over the last ten years.

Since 2009 the quality of NFC loans was worse than that of HH loans, on average. Until 2016, the NPL ratio for consumer loans was low at around 10%, with slight increases after the periods of negative economic growth in 2009, 2012 and 2014. Housing loan quality showed a constant deteriorating trend from a 3.8% NPL ratio in 1Q 2009 to 9.5% in 1Q 2016, slightly decreasing thereafter to around 5% more recently – slightly higher than the cash loans NPL ratio (Figure 6).

Figure 6 / NPL ratio by type of loans in comparison to GDP growth in Serbia, 2009-2018, in %



Note: Periods with negative real GDP growth rates are highlighted in grey.

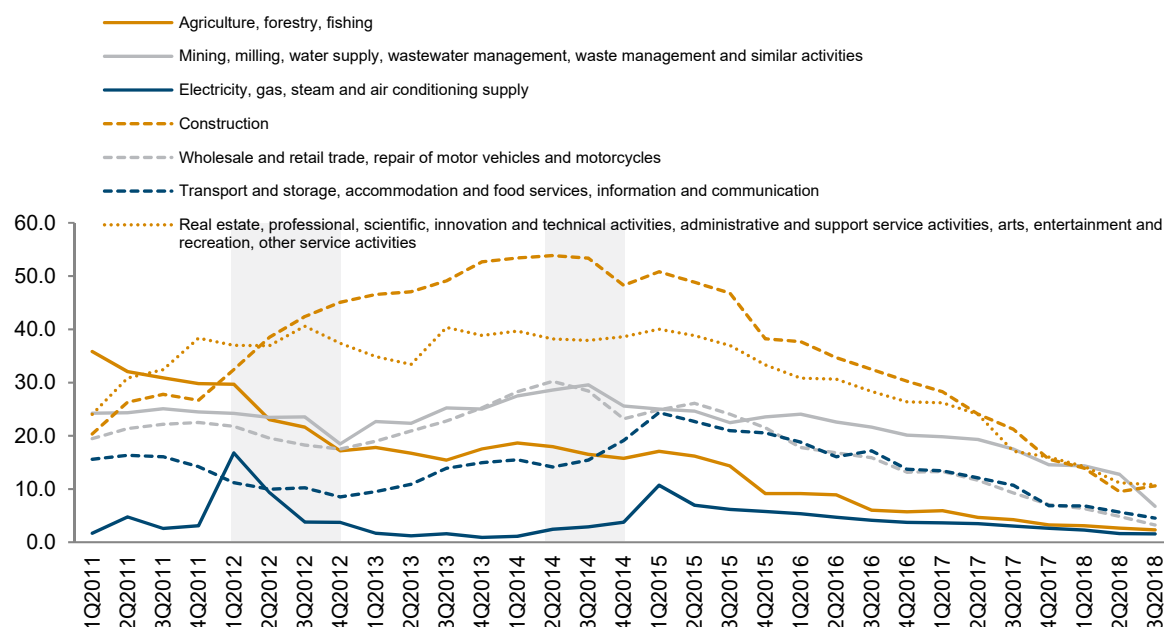
Sources: National Bank of Serbia, Statistical Office of the republic of Serbia.

Out of the different categories of loans, HH cash loans in foreign currency (or indexed to foreign currency) and HH housing loans in Serbian dinar (RSD) were the most sensitive to the 2012 and 2014 economic downturn periods. The recent development shows that a sharper and earlier reduction of the NPL ratio was possible for cash loans in foreign currency in comparison to housing loans in national currency. NPLs related to cash loans in foreign currency declined by RSD 3 billion in 2017.

In general, NPL reduction in Serbia started in 2015 and was backed by new National Bank of Serbia (NBS) regulations in the framework of the Action Plan on NPL Strategy (in place since August 2015) and additional NBS measures on write-off encouragement (since mid-2017), as well as trade in NPL facilitation (since mid-2016). Adopted in mid-2017, a new regulation imposed a 'requirement that all receivables whose allowances for impairment equal 100% of their gross book value be written off from

the balance sheet'.⁶ Major channels of NPL reduction in the past two years were write-offs and, to a lesser extent, selling of NPLs on the market.

Figure 7 / NPL ratio for NFCs by economic activities in Serbia, 2011-2018, in %



Notes: Periods with negative real GDP growth rates are highlighted in grey. Private companies only.

Source: National Bank of Serbia.

The most sensitive economic sectors in terms of loans quality reactions to crises in Serbia were the construction, real estate and professional, scientific and administrative activities as well as mining and processing (Figure 7).

2.5. Non-performing loans in Slovenia

Immediately following the global financial crisis, Slovenia experienced a steep real GDP decline of 7.8% in 2009. After a brief recovery, the economy contracted again in 2012-2013, prompted by a delayed reaction to the internal imbalances accompanied by a domestic banking crisis. In 2012 and 2013 real GDP contracted by 2.7% and 1.1% respectively.

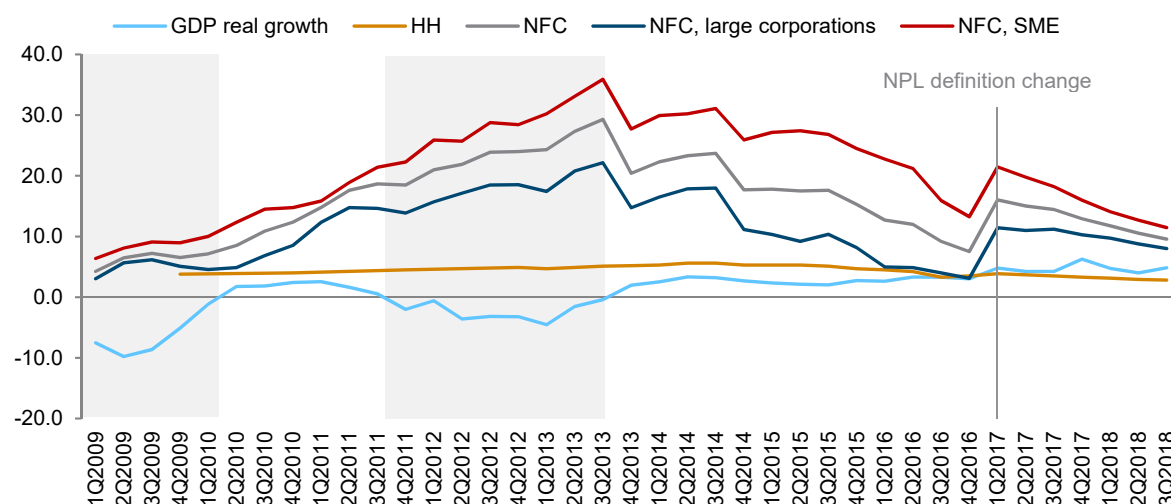
In both cases loans to NFCs in Slovenia were more responsive to the economic recession periods than credits to HH. A breakdown by corporation size demonstrates that SMEs were affected to a particularly large extent, with increases of NPL ratios until the peak in 3Q 2013 by 32 percentage points. For large corporations the equivalent figure was 21 percentage points (Figure 8).

For Slovenia a detailed breakdown of NPL ratios in HH loans is available only from 2017, according to the broader definition of the European Banking Authority (EBA) methodology. The new breakdown includes loans with potential repayment problems in the future (90 days overdue and where the creditor

⁶ http://www.nbs.rs/internet/english/90/90_2/fsr_2017.pdf_p.4

presumes that, without realising the collateral, the debtor will not be able to repay the loan). In the last two years, NPLs for consumer loans were around one percentage point higher than for housing purposes.

Figure 8 / NPL ratio by type of loans in comparison to GDP growth in Slovenia, 2009-2018, in %



Note: Periods with negative real GDP growth rates are highlighted in grey.

Sources: Bank of Slovenia, Eurostat.

NPL resolution in Slovenia was supported by state interventions via recapitalisation of banks and transfer of NPLs to the Bank Assets Management Company in 2013, changes in insolvency legislation in 2014, adopting guidelines and recommendations as supervisory measures by the Bank of Slovenia. In the period 2014-2017, NPLs of SMEs were reduced mainly due to sales and other methods and, in the second place, due to write-offs.⁷

⁷ <http://pubdocs.worldbank.org/en/113801527523014808/NPL-Conference-Day1-6-Darko-Torkar.pdf>

3. DETERMINANTS OF DIFFERENT TYPES OF NPLS

In this step of our analysis we estimate what factors drive NPL ratios in ten CESEE countries⁸, differentiating by types of loans. There is a rich theoretical literature on the subject of the interactions between the financial system and the wider economy. The most prominent examples are Bernanke and Gertler (1989) and Bernanke, Gertler and Gilchrist (1998), who developed the concept of the ‘financial accelerator’. They argue that credit markets are procyclical and that information asymmetries between lenders and borrowers, as well as the balance sheet, amplify and propagate credit market shocks to the economy.

Empirical studies of NPLs (Jakubik and Reininger, 2013; Klein, 2013; Skarica, 2014; Tomas Zikovic et al., 2015) identify the following main factors influencing NPL dynamics. Real GDP growth and employment are negatively associated with NPLs, as a growing economy increases borrowers’ income and ability to repay debts. In the short run, when wages are sticky, a rise in inflation decreases borrowers’ real income and increases costs both for companies and households – thus lowering the amount of available funds for debt repayment. An increase in interest rates weakens borrowers’ debt servicing capacity. NPLs should increase following rapid credit growth, which may result in a bust, therefore an increase of domestic loans should be associated with higher levels of NPLs.

We estimate a linear model for panel data explaining changes in the NPL ratio, using all the variables in first differences/growth terms. The use of a fixed effects technique allows us to capture the country-specific effects and the unobservable differences between countries. As the NPL ratio is a leading variable, we use lags of the explanatory variables. Lag order selection based on the time-series approach yielded inconclusive results, therefore we based the choice of a lags order on the model’s best fit criterion (using R^2 and F-test statistics). The second lag on average turned out to have the highest explanatory power.

- › *dNPL* – change in NPL ratio, in percentage points (pp); the suffix *HH* denotes loans to households, *Consumer* – loans to households for general consumption, *Housing* – loans to households for housing, *Corp* – loans to non-financial corporations
- › *GDP_growth* – real GDP growth rate, in %
- › *CPI_growth* – CPI growth rate, in %
- › *PPI_growth* – PPI growth rate, in %
- › *dUnempl* – change in unemployment rate, in pp
- › *dRIR* – change in real policy rate, CPI adjusted, in pp
- › *HHLoans_growth* – rate of growth of loans to households, in %
- › *ConsLoans_growth* – rate of growth of loans to households for general consumption, in %
- › *HousingLoans_growth* – rate of growth of loans to households for housing, in %
- › *CorpLoans_growth* – rate of growth of loans to non-financial corporations, in %

⁸ The countries investigated comprise Bosnia and Herzegovina, the Czech Republic, Estonia, Croatia, Lithuania, Latvia, Poland, Romania, Serbia, and Slovenia. Montenegro was excluded due to data limitations.

We considered using the real growth rate of gross fixed capital formation in the corporate loans equation, but it is highly correlated with the GDP growth variable. We opted for using the latter as it improves the explanatory power of the model.

In an alternative specification we estimate OLS without fixed effects, but instead introduce dummy variables for four SEE countries *BA*, *HR*, *SI*, *RS* in order to see whether there are country-specific characteristics that influence developments in NPLs in addition to the macroeconomic variables explicitly estimated.

L_i denotes the i th lag of a given variable. Most of the variables enter the equation with the second lag, however, there are some exceptions which will be discussed below.

The results of the estimations are presented in Table 2.

According to the results of our estimation, **GDP growth** has a statistically significant negative effect on NPLs in all categories of loans. A particularly strong effect is estimated for **loans to non-financial corporations**, probably indicating companies' higher sensitivity to business cycles as compared with households. The coefficient of the variable in the equation for **loans to households for general consumption** has the lowest absolute value among all the types of loans, suggesting a weaker dependence of NPL performance on business cycles. **Loans to households for housing** are often prone to boom and bust cycles, thus there is a higher absolute value of the GDP growth's coefficient.

Both **CPI** and **PPI** have a positive effect on NPLs, with CPI coefficients being fairly similar across different types of loans to households. **Changes in real interest rates** do not appear to have a significant impact on NPLs in the sectors of loans to households for general consumption and housing; however, companies are more susceptible to the dynamics of real interest rates and have a higher probability of default on their debt during periods of monetary tightening. As the CPI effects are similar, this suggests that what matters for companies is the nominal interest rate. This may be because corporates have a greater share of floating rate loans.

Growth in unemployment is estimated to contribute to the accumulation of NPLs. It affects the corporate loans sector much more strongly than the household one. **Loans to households for general consumption** stand out in this respect as it takes longer for unemployment to affect the ability of households to repay their loans of this type; the coefficient of the variable becomes statistically significant only when it enters the equation in the fourth lag. Most likely this peculiarity can be attributed to the lower size of consumer loans, which makes it easier to repay them even after the loss of a job, and because of the possibility to get help from family or friends.

Previous dynamics of loans has a significant impact on NPLs across all the types of loans. The faster the loans grew in the past, the higher is the NPL accumulation. In the sector of **loans to households for housing**, loan growth has a more delayed effect on NPL formation – it takes four quarters to get through, in contrast to two quarters for loans to households for general consumption (the coefficient of loans growth becomes significant only in the fourth lag).

Table 2 / Estimation results

VARIABLES	(1) dNPL_HH	(2) dNPL_Consumer	(3) dNPL_Housing	(4) dNPL_Corp	(5) dNPL_HH	(6) dNPL_Consumer	(7) dNPL_Housing	(8) dNPL_Corp
L2.GDP_growth	-0.0385*** (0.00780)	-0.0334*** (0.0103)	-0.0504*** (0.0102)	-0.117*** (0.0169)	-0.0379*** (0.00775)	-0.0349*** (0.0103)	-0.0503*** (0.0102)	-0.118*** (0.0167)
L2.CPI_growth	0.0883*** (0.0116)	0.0855*** (0.0170)	0.0771*** (0.0170)		0.0888*** (0.0112)	0.0859*** (0.0165)	0.0774*** (0.0165)	
L2.dUnempl	0.111*** (0.0299)		0.0878** (0.0370)	0.215*** (0.0672)	0.111*** (0.0298)		0.0916** (0.0370)	0.216*** (0.0670)
L2.dRIR	0.0623** (0.0280)	-0.0108 (0.0356)	0.0305 (0.0367)	0.166*** (0.0620)	0.0623** (0.0279)	-0.0112 (0.0357)	0.0326 (0.0367)	0.167*** (0.0617)
L2.HHLoans_growth	0.00276* (0.00161)				0.00241 (0.00154)			
L4.dUnempl		0.0890** (0.0364)				0.0925** (0.0364)		
L2.ConsLoans_growth		0.00519** (0.00226)				0.00613*** (0.00211)		
L4.Housing Loans_growth			0.00225* (0.00129)			-0.0349*** (0.00211)	0.00300** (0.00121)	
L2.PPI_growth				0.0381** (0.0150)				0.0403*** (0.0145)
L2.CorpLoans_growth				0.0257*** (0.00470)				0.0249*** (0.00461)
BA					0.269** (0.107)	0.253** (0.121)	0.268** (0.124)	0.165 (0.233)
HR					0.0840 (0.101)	0.0849 (0.121)	0.0796 (0.110)	0.144 (0.224)
SI					0.0861 (0.128)	-0.0615 (0.249)	0.127 (0.255)	0.184 (0.218)
RS					-0.183 (0.149)	-0.395** (0.175)	-0.0380 (0.168)	-0.765** (0.335)
Constant	-0.146*** (0.0417)	-0.169*** (0.0522)	-0.0863 (0.0539)	0.108 (0.0721)	-0.170*** (0.0483)	-0.186*** (0.0605)	-0.134** (0.0628)	0.0939 (0.0866)
Observations	455	346	352	479	455	346	352	479
R-squared	0.275	0.150	0.175	0.223	0.287	0.185	0.196	0.241
Number of countries	10	10	10	10	10	10	10	10

In the equations with SEE country dummies, **Bosnia and Herzegovina** stands out as the country where NPLs in all three types of loans to households grow faster than in other countries due to unobserved time-constant characteristics. **Serbia**, by contrast, appears to have slower growth of NPLs in loans to households for general consumption and loans to non-financial corporations as compared to its peers.

4. CONCLUSIONS

An analysis of post-crisis developments in non-performing loans in CESEE countries shows that the household loans sector has accumulated lower shares of bad loans than non-financial corporations, on average across all countries. Data on the small and medium-sized enterprises (SME) sub-segment demonstrated worse performance in terms of NPLs than average ratios for non-financial corporations. However, when it comes to different types of household loans, NPL dynamics has been heterogeneous and rather country specific. In the third quarter of 2018 housing loans had higher NPL ratios than consumer ones in Bosnia and Herzegovina (by 2.0 pp), Serbia (by 1.8 pp), Latvia (by 0.5 pp) and Bulgaria (by 0.2 pp). At the same time, for Poland, Slovakia, the Czech Republic, Romania, Lithuania, Estonia, Slovenia, Croatia and Hungary, consumer loans seem to be at the moment more risk-bearing than those dedicated to housing. The difference between NPL ratios for consumer loans and those for housing loans in these countries varies between 0.3 pp in Hungary and 8.6 pp in Poland.

The econometric analysis of the macroeconomic determinants of NPLs shows that, in line with the findings of the descriptive analysis, loans to non-financial corporations appear to have a higher sensitivity to business cycles as compared with households: they react more strongly to changes in GDP growth, monetary tightening/easing, and unemployment changes.

Unsecured consumer loans are, according to our estimations, least dependent on business cycle dynamics as changes in GDP growth have the lowest impact on NPLs in this sector – lower than both in corporate loans and housing loans. Additionally, it takes longer for changes in unemployment to impact the NPL ratio as compared with other types of loans. At the same time, NPLs in unsecured consumer loans react more strongly to previous loans accumulation dynamics than housing ones, which might imply that boom and bust cycles have a shorter duration in this sector.

The pass-through of macroeconomic trends to NPLs appears to be rather short – it takes not more than two quarters for changes in GDP growth, unemployment levels, prices and real interest rates to impact the quality of banks' assets. This means that banks have to be able to react fast to changes in the macroeconomic environment and adjust their credit policies accordingly. Using macroeconomic forecasts could be helpful for future risk evaluation. Though unsecured consumer loans appear to be least susceptible to economic downturns, it is important to avoid explosive growth in this sector as it can soon become unsustainable.

Based on our analysis, we recommend the following policy priorities for the banking sectors in CESEE:

- › Macprudential authorities should develop early warning systems to monitor the risks of credit portfolio deterioration and anticipate the build-up of future NPL problems. Their focus should be on signalling potential system-wide increases in NPLs at an early stage. The setting up of such systems will allow macroprudential authorities to communicate their views regarding the risks underlying potential system-wide increases in NPLs, and the need to address these at an early stage.
- › In some countries, better frameworks for bad loan resolution should be developed, especially in relation to corporates, where in some cases NPLs still remain high long after the crisis. This includes the further development of secondary markets for selling bad loans by removing barriers to credit servicing and to the transfer of bank loans to third parties (Bosnia in particular is not very advanced on this). The strengthening of legal system in this area should increase the willingness of outsiders to

take on bad loans. In addition, inefficiencies in the legal and judicial system regarding mechanisms of debt enforcement and collateral foreclosure should be addressed.

- › Engaging with the Vienna Initiative on promoting cross-border regulatory framework and NPL resolution mechanisms should continue. As the lion's share of the banking sector in the SEE countries belongs to a handful of big Western-owned parent banks, coordination between them is needed to avoid rapid deleveraging in case of rising NPLs. In the framework of the Vienna Initiative, Western banks can have access to support and funding in exchange for maintaining their exposures and recapitalising their subsidiaries in the CESEE region.

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APPENDIX

Selected SEE countries

Bosnia and Herzegovina

Definition: The NPL ratio is defined as NPLs divided by total loans. NPLs are loans in sub-standard, doubtful and loss loans, whose due principal and/or interest is not collected for longer than 90 days from the day of their agreed maturity or the loans with which the liabilities based on interest not collected in that period, have been capitalised.⁹

Data source: Central Bank of Bosnia and Herzegovina (CBBH), based on data by the Banking Agency of the Federation of Bosnia and Herzegovina and the Banking Agency of Republika Srpska.

Time period used in the sample: 4Q 2018 to 3Q 2018.

Breakdown availability: The NPL ratio for total economy is publicly available; data by institutional sectors as well as a more detailed breakdown (households: general consumption, housing, business activity) are not published (obtained on request).

Note: As data collection is a responsibility of banking agencies of entities (Federation of Bosnia and Herzegovina and Republika Srpska) the CBBH does not guarantee that all possible revisions are included.

Croatia

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. NPLs represent category B and C loans (more than 90 days overdue) since 4Q 2018 and partly recoverable and fully irrecoverable loans until 3Q. The attribution of loans to categories has varied over time.

Data source: Croatian National Bank.

Time period used in the sample: 4Q 2001 to 3Q 2018 (the detailed breakdown for HH NPLs starts from 1Q 2004, consumer loans statistics are possible only from 1Q 2010).

The category 'mortgage loan' is defined by the Croatian National Bank as a non-purpose credit (the purpose is unknown) granted by a credit institution to customers on the basis of a pledge on real estate and its repayment is secured by a real coverage (a residential or business space, land, a farm and the like) and thus the security of the loan repayment does not arise from the debtor's creditworthiness but from the value of the property.

Breakdown availability: All NPL ratios are publicly available from 4Q 2008.

⁹ Methodology for Compilation of Financial Soundness Indicators, Central Bank of Bosnia and Herzegovina, 2017 (<https://www.cbbh.ba/content/read/1120>).

Montenegro

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. For the total economy, NPLs are those more than 90 days overdue, for HH and NFCs until 2012 NPLs are loans more than 30 days overdue, from 2013 more than 90 day overdue.

Data source: Central Bank of Montenegro.

Time period: Total economy NPLs from 1Q 2008, NPL ratios for households and non-financial corporations from 1 Q 2013 on a quarterly basis, for 2008-2012 on a semi-annual basis only. Data have not been used in the sample for regressions as no information about consumer and housing loans were available.

Breakdown availability: The NPL ratio for the total economy is publicly available from 4Q 2008; NPL ratios for households and non-financial corporations as well as a detailed national breakdown were obtained on request.

Serbia

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. The National Bank of Serbia applies the following methodology to classify loans as NPLs: 'NPL means the total outstanding debt under an individual loan (including the amount of arrears):

- › where the payment of principal or interest is past due (within the meaning of the decision on classification of balance sheet assets and off-balance sheet items) over 90 days;
- › where at least 90 days of interest payments have been added to the loan balance, capitalised, refinanced or delayed by agreement;
- › where payments are less than 90 days overdue, but the bank has assessed that the borrower's repayment ability has deteriorated and doubts that the payments will be made in full.'¹⁰

Data source: National Bank of Serbia.

Time period used in the sample: For the total economy from 1Q 2007, for the institutional sector and detailed breakdown for HH and for NFCs from 3Q 2008, currency differentiation started in 2012. For non-financial corporations' loans there was a slight adjustment due to the use of the new classification of economic activities from 1Q 2011. In the dataset used for regression, data have been merged.

Breakdown availability: Data on NPLs for the total economy and a detailed breakdown for HH and corporations (economic activities, private companies only) are publicly available and can be found in the statistical annexes to the quarterly Banking Sector Reports of the National Bank of Serbia. Data for the institutional sectors have been calculated by wiiw using values of NPLs and statistics on total loans by institutional sectors.

¹⁰ Banking Sector in Serbia – Third Quarter Report 2018, National Bank of Serbia, September 2019.

Slovenia

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. NPL definition: until 2016 classified claims more than 90 days in arrears¹¹, from 2017 non-performing exposures to total exposures (NPE) according to EBA definition¹². The data on non-performing exposures are calculated on the basis of the banks' modified reporting under the Guidelines for implementing the Regulation on reporting by monetary financial institutions in accordance with the CRD IV and the EBA definition published in Commission Implementing Regulation (EU) 2015/227 (OJ L 48 of 20 February 2015), NPEs include exposures not only 90 days overdue, but also where the creditor presumes that potential repayment problems in the future may arise. Non-performing exposures include not only loans, but also debt securities and off-balance-sheet exposures. The difference between NPE and NPL is not large (if any) for the HH sector, as almost all exposures to households are loans. But the comparability of data with other countries for the total economy, NFCs, and a detailed breakdown for NFCs is limited. The share of exposures for debt securities and off-balance-sheet in total NPE is small, but relatively high in the total exposure (denominator), which makes NPE ratios smaller than NPL ratios with stronger underestimation for the NFC segment. For comparison, in 3Q 2018 NPE ratios for the total economy were 4.5% and for NFCs 9.6%, whereas NPL ratios were 6.4% and 14.6% respectively.¹³ We stick to the NPE ratio indicator in the dataset, as it is reported by the Bank of Slovenia as the national indicator for asset quality and the use of this indicator renders the dataset for the period 2017-2018 harmonised between all types of loans.

Data source: Bank of Slovenia.

Time period used in the sample: from 4Q 2007, for HH from 4Q 2009; a breakdown for is possible only from 2017 when the new reporting for banks started; methodological break brake described above from 2017.

Breakdown availability: Data on NPLs according to the old definition or NPE for the total economy, NFCs (with a breakdown by economic activities) and HH, as well as for NPLs for the total economy and NFCs according to the new definition are publicly available. They can be found in the Monthly Reports on Bank Performance or online under the Supervisory disclosure section of the Bank of Slovenia. A detailed breakdown for HH (consumer, housing, other loans) as well as statistics for SMEs and large corporation are not published (obtained on request).

¹¹ Table 3.2 and Table 3.4 of the Monthly Report on Bank Performance, Bank of Slovenia (<https://www.bsi.si/en/publications/monthly-report-on-bank-performance>).

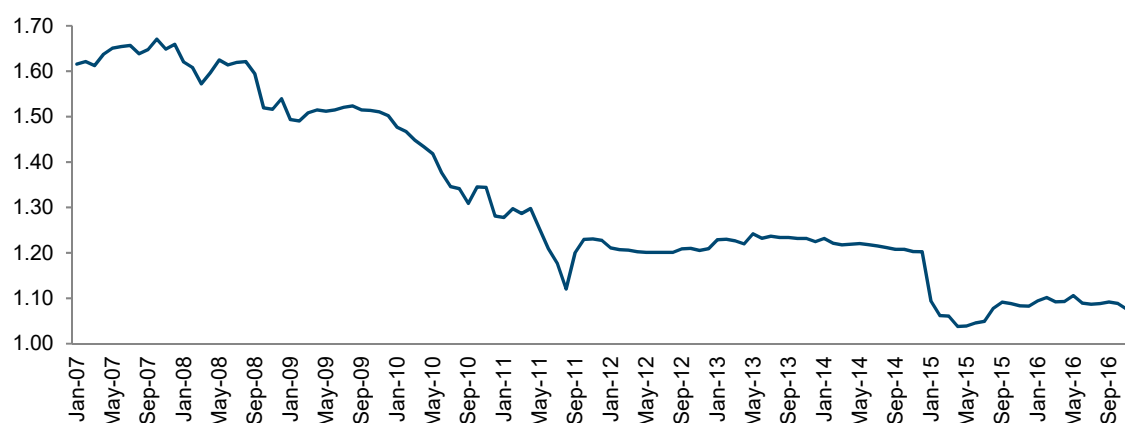
¹² Table 3.1 and Table 3.3 of the Monthly Report on Bank Performance, Bank of Slovenia (<https://www.bsi.si/en/publications/monthly-report-on-bank-performance>).

¹³ <https://www.bsi.si/en/financial-stability/banking-system-supervision/supervisory-disclosure/information-on-non-performing-exposures>

BOX A1 / IMPACT OF SWISS FRANC APPRECIATION AGAINST THE EURO ON LOAN QUALITY IN SEE COUNTRIES

Since the global financial crisis the Swiss franc has undergone two pronounced periods of appreciation against the euro: first from 2007 to 2011, and again in 2015 following the decision of the Swiss National Bank (SNB) in January of that year to remove the fixed peg to the euro (Figure A1). This caused a deterioration in asset quality for loans denominated in or indexed to Swiss francs. The magnitude of the deterioration in asset quality depended in each SEE country both on the exposure to currency risk, and the policy response. These policy measures tended to shift the costs from borrowers to banks.

Figure A1 / Evolution of the monthly average exchange rate CHF/EUR, 2007-2016



Source: Eurostat.

Bosnia and Herzegovina

According to CBBH (2010), the appreciation of the Swiss franc did not have a substantial effect on the household NPL ratio in Bosnia and Herzegovina. By the end of 2010, the share of Swiss franc and Swiss franc-indexed loans in household loans amounted to only 7.8%, and they were concentrated in only two banks. Around 20% of Swiss franc loans were classified as non-performing, but the magnitude of losses was softened by the maturity structure, as 90% of outstanding Swiss franc-denominated debt was long-term (over ten years). Swiss franc exposure was reduced via repayment, restructuring, conversion of old loans and the cessation by banks of the issuance of new Swiss franc-denominated credits in 2013. This helped to mitigate the impact on asset quality of the further sharp appreciation of the Swiss franc in 2015. Even with the NPL ratio for Swiss franc loans increasing to 57.9% in that year, their share of 4.2% in total household loans meant that the impact of worsening asset quality on the household segment was small. Using data from the CBBH (2015), we estimate this impact as -0.3 percentage points on overall household NPL ratios. This contribution is not visible in the household NPL ratio statistics, as in 2015 banks actively reduced non-performing debt via collateral collection or loan repayments by guarantors and co-borrowers. Additionally, from March 2016 borrowers were given the option to convert Swiss franc loans into euros at a favourable exchange rate. By end-June 2016, 40.7% of Swiss franc loans were restructured using this option.

Croatia

By the end of 2010, high exposure of households to Swiss franc lending in Croatia was mainly observed for housing and car loans with 40% and 51% shares in total loans for each client segment, respectively. Surprisingly, car loans quality improved over 2010 due to restructuring measures taken by issuing banks. It is difficult to precisely separate the Swiss franc exchange rate appreciation effect, but the NPL ratio for housing

loans indexed to the Swiss franc was twice as high at the end of 2010 as compared to the end of 2009 (CNB, 2011). The overall deterioration of NPL ratios for housing loans by 2 percentage points over 2007-2010 included this effect. In 2015 the exposure to the Swiss franc was already low for car loans (4.4%), but still high for housing loans (33.6%). To smoothen the currency shock for households, in September 2015 the Croatian parliament passed legislation allowing the conversion of Swiss franc loans at a fixed exchange rate despite criticism by the ECB and foreign banks in Croatia. Thus, most of the burden of appreciation was shifted to the banks (though it was somewhat alleviated by new tax benefits (wiiw, 2015)). This policy measure appears to have been effective, as the NPL ratio of this client segment increased only slightly – from 8.8% at the end of 2014 to 9.8% at the end of 2015.

Montenegro

In Montenegro the share of foreign currency loans in total loans was 2.3% in 2011, with Swiss francs being the major foreign currency used. One bank¹⁴ had a more significant exposure, though, with a 21.1% share of loans denominated in this currency in total loans, and was therefore hit by the Swiss franc appreciation in 2008-2011. In 2015 only loans to households, again concentrated in one bank, were impacted by Swiss franc appreciation (see CBCG, 2015). In August 2015 a law entered into force that allowed the conversion of Swiss franc loans into euros at the exchange rate valid the day of the loan agreement, and a recalculation of loans at a flat interest rate. In the absence of publicly available NPL statistics with currency breakdown, one can only rely on the above-mentioned facts to suggest that Swiss franc strengthening was not very significant for loan quality performance in Montenegro.

Serbia

In Serbia, exposure to Swiss franc was concentrated in the household loans segment. However, the overall level of loans in this currency in total household loans was moderate, and gradually reduced from 23% in 2008 to 21% in 2010 and 14% in 2014. The depreciation of the Serbian dinar relative to the euro had a stronger impact on loan quality, as euro exposure was significantly higher. More than half of total household loans were denominated in euros in 2008-2010, and still around 47% by the end of 2014. The NPL ratio for household loans was volatile in 2008-2011 in the range of 7-8%. In 2015, the NPL ratio rose only marginally to 9.5%, from 9.3% in 2014. Due to the lack of data on loan quality specifically in Swiss francs, it is not possible to quantify the incremental contribution of currency appreciation on NPL ratios. However, it appears to have been rather small.

Slovenia

In Slovenia Swiss franc appreciation affected mostly loans to households (more than 70% of all Swiss franc-denominated loans), although the impact was rather moderate due to a low exposure. For housing loans, which were mostly affected, the share of loans in Swiss francs or with a currency clause constituted 22% in all housing loans in 2010 (Bank of Slovenia, 2011). As no NPL data by client segment or by currency are available for 2008-2010, one can speculate that probably the effect on loan quality was lagged, as the NPL ratio for households deteriorated only by 0.2 percentage points in 2010 compared to 2009 but continued to increase over the following years. In 2015, again mostly housing loans to households were hit, but this time to a lesser extent as the share of Swiss franc loans in total housing loans declined to 14% (Bank of Slovenia, 2015). There was no policy response regarding Swiss franc-denominated loans. But in 2015, the real estate market in Slovenia experienced a revival and new loans for housing grew by 43% over three quarters of 2015. This contributed to the reduction of Swiss franc exposure in total lending for housing to 12% (Bank of Slovenia, 2016). Detailed data on loan quality for housing loans are not available for this period, but the NPL ratio for households was stable over 2015 and even went down from 5.3% to 4.7% at the end of the year, which suggests a rather low impact of the Swiss franc appreciation on loan quality.

¹⁴ The Financial Stability Report of the CBCG does not name this bank.

Table A1 / NPL ratio for Bosnia and Herzegovina, Croatia and Montenegro by type of loans in 2009-2017, in %

Country	Loan type	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bosnia and Herzegovina	Total economy	5.9	11.4	11.8	13.5	15.1	14.2	13.7	11.8	10.0
Croatia	Total economy	7.8	11.2	12.4	13.9	15.7	17.1	16.7	13.8	11.4
	General government	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0
	Non-financial corporations	12.9	19.6	22.1	27.7	31.8	34.9	34.7	28.3	22.2
	Agriculture, forestry and fishing	.	14.4	11.8	9.6	11.9	17.3	16.9	12.9	11.4
	Mining and quarrying	.	30.0	29.8	32.3	31.6	30.6	32.2	17.8	15.6
	Manufacturing	.	14.2	16.0	23.0	27.6	32.2	34.5	25.0	19.0
	Construction	.	29.5	35.5	46.6	59.3	64.0	67.2	65.7	55.4
	Wholesale and retail trade; repair of motor vehicles and motorcycles	.	20.4	24.1	24.7	29.8	36.2	35.0	28.4	22.1
	Transportation and storage	.	18.2	17.7	13.2	14.4	14.4	13.7	11.1	15.5
	Accommodation and food service activities	.	21.6	26.2	23.6	23.9	20.3	19.9	15.6	13.1
	Information and communication	.	38.1	38.4	45.3	50.5	49.4	46.5	52.3	19.3
	Real estate activities	.	15.3	18.0	29.5	30.3	39.7	37.6	35.8	25.9
	Professional, scientific and technical activities	.	24.6	32.3	41.9	40.5	38.8	38.3	27.1	19.5
	Other activities	.	11.6	11.2	17.4	16.0	15.3	12.5	9.8	19.8
	Households	5.8	7.8	8.6	9.5	11.1	12.0	12.2	10.3	8.1
	Housing loans	2.7	4.5	5.2	6.2	8.1	8.8	9.8	8.2	6.2
	Mortgage loans	11.9	22.5	21.5	23.8	29.7	32.7	33.5	30.1	26.8
	Car loans	4.2	4.1	4.0	5.0	5.6	6.4	7.2	5.6	5.3
	Credit card loans	3.0	4.0	4.0	4.4	4.6	4.1	3.8	3.2	2.3
	Overdrafts	.	14.7	15.9	14.9	14.9	12.9	12.2	10.0	6.0
	General purpose cash loans	.	7.9	8.4	9.1	9.5	9.7	9.2	7.5	6.0
	Investment loans	.	18.4	21.9	21.2	22.0	28.8	24.7	22.0	16.7
	Other household loans	9.0	16.7	20.2	23.3	29.2	36.6	37.5	33.8	29.6
	Other sectors	5.7	9.8	6.8	10.9	9.9	9.8	9.0	5.5	5.0
Montenegro	Total economy	6.8	18.3	12.9	14.0	17.5	15.9	12.6	10.3	7.3
	Households	16.3	16.3	15.7	14.6	11.9	10.7	8.3	6.9	5.5
	Non-financial corporations	28.0	29.2	23.1	34.5	34.2	30.7	22.3	19.8	14.5

Note: National definitions of NPLs and methodological breaks in time series are documented in the Appendix above.

Sources: Central banks of individual countries, wiiw calculations.

Table A2 / NPL ratio for Serbia and Slovenia by type of loans in 2009-2017, in %

Country	Loan type	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serbia	Total economy	15.7	16.9	19.0	18.6	21.4	21.5	21.5	17.0	9.8
	Households	7.7	6.7	6.8	7.3	8.2	9.3	9.5	8.2	5.0
	Non-financial corporations	18.1	19.1	20.0	16.7	20.7	21.8	18.7	15.4	9.9
	Natural persons total	8.7	8.8	9.1	10.1	10.8	11.4	11.7	10.0	5.9
	Cash loans	11.3	9.3	8.8	10.6	10.6	10.4	10.1	7.5	4.3
	Credit cards	7.8	10.8	10.8	11.7	12.8	14.3	14.2	12.5	7.0
	Overdraft	16.6	14.9	13.8	14.1	14.9	15.8	17.2	16.2	10.8
	Consumer loans	6.4	6.4	7.0	17.8	25.0	28.5	22.8	21.7	4.3
	Agricultural activity	11.6	14.6	13.5	14.6	13.5	12.6	10.9	9.4	5.6
	Other activities	13.5	20.4	25.9	27.4	30.0	26.8	27.9	24.7	10.1
	Housing construction	4.7	5.5	5.8	6.0	6.9	8.2	9.5	8.7	6.2
	Car loans				4.3	5.2	6.3	6.3	6.8	4.1
	Other	32.2	24.1	23.6	18.6	26.3	26.0	24.7	23.3	28.6
	Private companies total			24.6	21.2	27.1	26.7	23.6	17.6	10.8
	Agriculture, forestry, fishing			29.8	17.2	17.5	15.8	9.1	5.7	3.3
	Mining, milling, water supply, wastewater management, waste management and similar activities			24.5	18.5	25.0	25.6	23.6	20.1	14.6
	Electricity, gas, steam and air conditioning supply			3.1	3.7	0.9	3.8	5.8	3.7	2.6
	Construction			26.7	45.1	52.7	48.3	38.2	30.3	15.6
	Wholesale and retail trade, repair of motor vehicles and motorcycles			22.5	17.5	25.3	23.2	21.5	13.1	7.1
	Transport and storage, accommodation and food services, information and communication			14.2	8.5	14.9	19.1	20.5	13.7	6.9
	Real estate, professional, scientific, innovation and technical activities, administrative and support service activities, arts, entertainment and recreation, other service activities			38.3	37.4	38.8	38.6	33.3	26.4	16.0
Slovenia	Total economy	4.8	8.1	11.3	14.5	13.4	11.9	9.9	5.5	6.0
	Households	3.8	4.0	4.5	4.9	5.2	5.3	4.7	3.5	3.3
	Non-financial corporations	6.5	12.4	18.5	24.0	20.4	17.7	15.3	7.5	12.9
	Agriculture, forestry, fishing, mining	7.1	6.3	10.4	17.5	15.9	13.7	14.1	8.6	12.5
	Manufacturing	6.2	9.0	11.2	17.0	15.8	12.3	8.8	5.1	6.1
	Electricity, gas, water, remediation	0.8	1.5	2.2	2.8	4.6	7.5	3.5	0.7	1.5
	Construction	7.8	19.9	51.2	62.2	49.4	45.1	40.4	26.0	22.2
	Wholesale and retail trade	5.1	13.8	12.0	14.6	18.7	18.8	16.1	6.7	20.0
	Transportation and storage	2.0	6.7	11.9	12.5	7.7	3.5	2.3	1.2	5.2
	Accommodation and food service	8.0	6.7	13.1	20.2	30.2	18.7	21.2	14.1	15.2
	Information and communication	1.8	22.9	25.0	24.4	13.6	13.6	14.9	5.8	5.5
	Financial and insurance activities	30.8	4.1	6.7	33.9	33.2	16.0	23.8	5.3	51.2
	Real estate activities	5.2	10.0	16.7	19.3	22.8	33.5	41.8	14.2	33.1
	Professional, scientific and technical	6.9	10.7	13.6	16.6	24.6	20.7	20.4	10.2	9.7
	Public services	2.5	3.4	5.1	12.6	9.4	10.5	9.3	7.5	12.2

Note: In 2017 data for Slovenia are for non-performing exposures (NPE). National definitions of NPLs and methodological breaks in time series are documented in the Appendix above.

Sources: Central banks of individual countries, wiiw calculations.

CEE peer countries

Czech Republic

Definition: The NPL ratio until 31.12.2017¹⁵ represents the ratio of non-performing loans to the total volume of loans, when non-performing loans are considered to be nonstandard, doubtful and loss-making loans (principal or interest payments 90 days overdue according to IMF definition)¹⁶. From 2018 NPLs are defined according to IFRS 9 and data correspond to the methodology according to Commission Implementing Regulation (EU) No 680/2014, laying down implementing technical standards with regard to supervisory reporting of institutions according to Regulation (EU) No 575/2013 of the European Parliament and of the Council, as amended (template F 18.00).

Data source: Czech National Bank, wiiw calculations.

Time period used in the sample: From 1Q 2002.

Breakdown availability: Publicly available data on values of NPLs and total loans on a monthly, quarterly and annual basis, NPL ratios are calculated.

Estonia

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. The baseline definition of the Central Bank of Estonia for NPLs comprises loans more than 60 days overdue.

Data source: Central Bank of Estonia (Eesti Pank), wiiw calculations.

Time period used in the sample: From 1Q 2000, for HH breakdown from 4Q 2008.

Breakdown availability: Publicly available data on values of NPLs and total loans.

Latvia

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. Until 2Q 2018 loans were considered non-performing if they were more than 90 days overdue. Starting from the 3Q 2018, the Financial and Capital Market Commission (FCMC) of Latvia started to publish data of supervisory financial reporting (FINREP) in accordance with Regulation (EU) No 680/2014 and FCMC's Regulations No 119 on Reporting of Supervisory Financial Information. FINREP data, provided by the banking sector, have been used in the reporting from the first quarter of 2018 as follows: consolidated data by the banks supervised on a consolidated basis (i.e. data on banks and their subsidiaries), as well

¹⁵

https://www.cnb.cz/en/supervision_financial_market/aggregate_information_financial_sector/financial_soundness_indicators/fsi_ukazatele_metodika.html

¹⁶ Financial Soundness Indicators Compilation Guide (with Amendments), IMF 2006 (<http://www.imf.org/external/pubs/ft/fsi/guide/2006/index.htm>).

as data of other banks and branches of foreign banks on a solo basis. The NPL definition includes not only loans more than 90 days overdue but also those that are unlikely-to-pay and are not past-due or past-due less than 90 days.

Data source: Financial and Capital Market Commission of Latvia, Banking Activities Reports¹⁷.

Time period used in the sample: For HH, NFCs and the total economy starting from 1Q 2006, for a detailed breakdown 4Q 2010-2Q 2018. In order not to introduce methodological breaks, time series for Latvia do not include 3Q 2018.

Breakdown availability: Publicly available data.

Lithuania

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. For the total economy, the NPL data source is the online publication of the Bank of Lithuania on key financial system indicators (quarterly): 1) Banking sector including foreign bank branches; 2) until 2Q 2014, non-performing debt instruments include impaired loans and loans overdue for more than 60 days (but unimpaired); 3) from 3Q 2014, indicators of non-performing debt instruments are published according to the new common European Union-wide definition, and are not entirely comparable with previous data; 4) consolidated data; 5) due to changes in data consolidation methodology, data from 1Q 2014 are not entirely comparable with previous data; 6) 3Q 2015-1Q 2016 data were adjusted eliminating accounting changes due to the transaction between 'Swedbank', AB, and Danske Bank A/S Lithuania Branch¹⁸. For NFCs, consumer and housing NPL statistics can be found in the Financial Stability Reviews with the same definition of NPLs as 60 days overdue, but calculations are made only for domestic banks and subsidiaries (excluding branches). As data for HH NPLs are not available, they are calculated as a weighted average over consumer and housing loans, mostly reflecting the housing loans NPL development with their weight fluctuating in the 80-90% range over the time period considered.

Data source: Bank of Lithuania.

Time period used in the sample: 1Q 2005 to 3Q2018, since 1Q 2008 publicly available online.

Breakdown availability: Publicly available data for the total economy, NFCs, consumer and housing loans, wiiw calculations for HH NPLs as a weighted average over housing and consumer loans.

Poland

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. NPLs are defined as 'impaired' loans until 2017 and as 'impairment' of loans since 2018. For the methodology until the end of 2017, 'the table "Impaired loans and advances of the banking sector, gross carrying amount" presents

¹⁷ <http://www.fktk.lv/en/statistics/credit-institutions/quarterly-reports/7030-2018.html>

¹⁸ <https://www.lb.lt/en/fss-key-financial-system-indicators>

loans and advances of the financial sector and non-financial sector, included in “Portfolio B”. Impaired loans and advances for financial reporting purposes mean: for banks applying International Accounting Standards – that there is objective evidence of impairment as a result of one or more events that occurred after the initial recognition of an asset (a “loss event”) and that loss event (or events) has an impact on the estimated future cash flows of the financial asset that can be reliably estimated; for banks applying Polish accounting regulations – loans and advances qualified to categories: substandard, doubtful, lost. Impaired loans and advances are presented in gross carrying amount¹⁹.

For the new methodology, ‘impairment’ is defined as ‘Credit impaired loans and advances and other demand deposits on financial and non-financial sector, gross carrying amount, Portfolio B’.

The total economy NPL ratio is calculated as the sum of NPL volumes for NFCs and HH divided by the total loans of the sum of NFCs and HH and reflects thus the ratio for the non-financial private sector only.

Data source: National Bank of Poland (Narodowy Bank Polski).

Time period used in the sample: For the total economy, NFCs and HH 1Q 2000 to 3Q 2018; for consumer and housing loans 1Q 2009 to 3Q 2018.

Breakdown availability: Publicly available data for volumes from 1Q 2009, calculations of NPL ratios by wiiw.

Romania

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. NPLs for the total economy since 1Q 2015 and for other indicators from 2Q 2015 according to EBA definition are 90 days past-due loans and loans unlikely-to-pay. Until 2014 loans more than 90 days overdue.

Data source: National Bank of Romania. Data on total economy NPLs are available in the online database under Aggregate Indicators for Credit Institutions²⁰. For data on households and a detailed breakdown by type, data from the Financial Stability Reports (FSR), *Chapter 2, The real sector*, have been used. For the period until 2015 the data source is FSR 2015; starting from 2Q 2015, it is FSR 2Q 2018²¹. Data on NPLs of non-financial corporations are available until 2015 from the online data table ‘Indicators used for setting the Counter Cyclical Buffer Rate’²² and from 2Q 2015 from the online data table ‘Stock of loans and NPL ratio to non-financial companies’²³.

Time period used in the sample: For the total economy and NFCs 1Q 2008 to 3Q 2018; for HH, consumer and housing loans 3Q 2008 to 3Q 2018.

¹⁹ <http://www.nbp.pl/homen.aspx?f=/en/statystyka/naleznosci/naleznosci.html>

²⁰ <https://www.bnro.ro/Interactive-database-1107.aspx>

²¹ <http://www.bnr.ro/Financial-stability-report--7674.aspx>

²² <http://www.bnr.ro/Data-sets-3205.aspx>

²³ <http://www.bnr.ro/NBR's-role-3275.aspx>

Breakdown availability: Publicly available data.

Data for the below-mentioned peer CEE countries are not used in the data sample for regression analysis due to missing observations in the immediate period after the outbreak of the global financial crisis, significant methodological breaks or lack of data in time series format.

Bulgaria

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. NPLs are 90 days past-due loans and loans unlikely-to-pay.

Data source: Bulgarian National Bank.

Hungary

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. NPLs are 90 days past-due loans and loans unlikely-to-pay. Housing loans for Hungary are household loans collateralised by residential immovable property, consumer loans represent the difference between household and housing loans.

Data source: Central Bank of Hungary (Magyar Nemzeti Bank).

Slovakia

Definition: The NPL ratio is defined as non-performing loans in per cent of total loans. NPLs are those loans when the borrower is considered to be in default if a) the bank assesses that the borrower will probably fail to meet his/her commitments to the bank, the subsidiary or parent company, without the security being realised; or b) the borrower is more than 90 days in arrears with a significant commitment to the bank, the subsidiary or parent company.

Data source: National Bank of Slovakia.

Table A3 / NPL ratio for the Czech Republic, Estonia and Latvia by type of loans in 2009-2017, in %

Country	Loan type	2009	2010	2011	2012	2013	2014	2015	2016	2017
Czech Republic	Total economy	5.2	6.2	6.0	6.0	5.9	6.1	5.8	4.8	4.0
	Non-financial corporations	9.1	10.5	10.0	9.7	10.2	11.4	11.5	9.8	8.1
	Households	3.9	5.0	4.9	5.1	4.9	4.7	4.0	3.2	2.5
	debt balances on current accounts	7.3	6.2	6.4	10.8	9.9	12.4	11.1	11.9	8.4
	receivables from payment cards	5.2	11.8	11.2	11.9	12.6	13.1	13.4	16.7	11.4
	consumer credit	8.8	12.1	11.7	12.5	12.3	11.8	10.7	7.7	5.3
	lending to households for house purchase	2.5	3.2	3.2	3.4	3.3	3.1	2.6	2.0	1.8
	of which: mortgage loans to households for house purchase	2.4	3.1	3.1	3.2	3.0	2.9	2.2	1.6	1.4
	other lending to households	3.7	4.9	6.1	6.3	5.3	4.3	3.2	2.5	2.2
	lending to households-trades	10.8	12.4	12.4	13.7	13.0	12.6	11.0	8.6	6.7
Estonia	Total economy	6.1	6.1	4.5	3.0	1.7	1.5	1.1	1.0	0.8
	Non-financial corporations	8.5	8.4	6.0	3.7	2.0	2.0	1.6	1.6	1.3
	Households	4.8	4.7	3.8	2.7	1.9	1.4	0.9	0.7	0.6
	consumer loans	9.2	8.9	8.0	6.0	4.6	3.7	2.2	1.7	1.2
	housing loans	4.1	3.9	3.2	2.2	1.4	1.0	0.7	0.5	0.4
Latvia	other loans	9.3	12.0	8.6	7.8	6.8	6.1	4.4	2.1	2.3
	Total economy	16.4	19.0	17.2	11.1	8.3	6.9	6.0	4.4	4.1
	Non-financial corporations	20.3	20.8	16.2	9.7	7.0	5.9	4.5	2.7	2.8
	Sectors of national economy total, incl.	.	19.6	15.4	9.2	6.5	5.4	4.0	2.3	2.5
	Agriculture, forestry and fishing	.	9.4	6.3	4.4	3.5	2.3	2.9	0.8	0.5
	Mining and quarrying	.	25.2	21.8	23.1	8.6	6.2	6.4	5.7	6.0
	Manufacturing	.	14.3	11.2	5.8	6.7	6.5	2.9	4.4	3.7
	Electricity, gas and heat supply	.	0.9	0.8	5.0	6.7	4.3	4.9	0.4	0.3
	Water supply and waste management	.	1.3	0.9	0.6	0.3	0.1	0.3	0.1	0.0
	Construction	.	30.4	27.2	17.7	8.6	7.1	5.8	3.1	4.8
	Wholesale and retail trade	.	16.0	14.0	10.1	5.0	5.8	3.3	1.7	3.0
	Transportation and storage	.	11.6	9.6	3.5	2.9	1.7	1.9	2.3	3.2
	Information and communications services	.	3.2	5.2	3.5	0.9	0.3	0.2	0.0	0.0
	Accommodation and catering services	.	26.4	20.0	13.2	16.8	12.6	7.2	2.4	3.2
	Financial and insurance activities	.	2.5	2.0	0.7	0.3	0.1	0.0	0.4	0.6
	Real estate transactions	.	28.0	21.5	13.4	9.8	8.4	6.5	3.5	4.3
	Professional, scientific and technical services	.	19.5	16.1	9.1	5.1	3.2	4.1	3.1	1.0
	Administrative and support service activities	.	8.2	9.2	5.4	2.3	1.4	3.7	1.8	0.1
	State administration and defence	.	0.0	1.0	1.1	0.0	0.0	0.0	0.0	0.0
	Education	.	12.2	17.4	0.1	0.2	0.2	0.1	0.0	0.0
	Health and social care	.	8.9	2.6	1.4	1.3	1.3	1.1	4.1	0.5
	Arts, entertainment and recreation	.	19.1	20.4	16.1	2.6	0.3	3.1	3.3	6.7
	Other services	.	30.9	19.2	6.6	3.6	1.6	5.3	3.0	0.1
	Households	16.8	18.4	19.3	15.2	12.0	9.5	7.6	5.3	3.5
	for housing purchases	.	16.2	16.3	13.2	10.2	7.9	6.2	4.1	2.8
	payment card and settlement account loans	.	21.3	20.0	17.0	11.5	8.6	9.6	8.4	5.1
	consumer credit	.	19.3	19.9	17.9	21.5	17.1	11.8	9.5	6.2
	other loans	.	37.7	44.9	34.6	26.1	23.9	21.5	15.6	9.2

Note: National definitions of NPLs and methodological breaks in time series are documented above in the Appendix.

Sources: Central banks of individual countries, wiiw calculations.

Table A4 / NPL ratio for Lithuania, Poland and Romania by type of loans in 2009-2017, in %

Country	Loan type	2009	2010	2011	2012	2013	2014	2015	2016	2017
Lithuania	Total economy	19.7	19.9	16.6	13.6	11.0	6.5	5.5	3.8	3.1
	Non-financial corporations	26.7	25.8	21.1	16.9	13.4	10.3	8.4	6.3	5.0
	Households	7.1	9.9	9.4	8.8	7.6	8.0	5.6	4.3	3.2
	housing loans	5.9	8.3	8.6	8.0	7.0	7.8	5.3	4.1	3.2
	consumer loans	14.4	19.8	16.2	15.3	13.0	9.9	8.3	6.7	3.5
Poland	Total economy	7.7	8.8	8.2	8.8	8.5	8.1	7.5	7.1	6.8
	Non-financial corporations	11.5	12.3	10.3	11.7	11.6	11.3	10.0	9.2	8.3
	SME	13.3	14.5	12.2	13.0	13.0	12.8	11.7	11.1	10.0
	Households	6.0	7.2	7.3	7.4	7.1	6.5	6.2	6.1	6.1
	housing loans	1.5	1.8	2.4	2.8	3.1	3.1	2.9	2.9	2.8
Romania	consumer loans	13.1	17.2	17.9	17.3	14.7	12.8	12.3	11.9	11.4
	Total economy	7.9	11.9	14.3	18.2	21.9	13.9	13.5	9.6	6.4
	Non-financial corporations	5.8	11.3	13.5	18.4	22.6	17.1	26.2	19.3	12.2
	SME	31.5	23.2	14.8
	Households	6.5	7.9	8.2	9.5	10.2	7.8	9.1	7.1	5.5
	real-estate loans	3.1	3.9	4.5	6.0	5.7	4.4	5.3	4.5	3.2
	mortgage-backed consumer loans	4.6	7.8	10.4	12.7	13.3	11.6	19.9	18.6	16.1
	non-mortgage backed consumer loans	9.9	11.1	10.1	12.0	13.2	9.5	9.2	6.1	5.4
	credit card and overdraft	6.9	8.9	6.9	5.8	13.4	10.1	4.7	2.6	2.5

Note: For Lithuania the household NPL ratio is calculated as a weighted average between consumer and housing loans. National definitions of NPLs and methodological breaks in time series are documented above in the Appendix.

Sources: Central banks of individual countries, wiiw calculations.

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Postanschrift: A 1060 Wien, Rahlgasse 3, Tel: [+431] 533 66 10, Telefax: [+431] 533 66 10 50
Internet Homepage: www.wiiw.ac.at

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