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Changes in the lending activity of banks in Poland, including the portfolio of non-financial corporate loans[1]

Aneta Kosztowniak,
Narodowy Bank Polski

[1] This contribution was prepared for the workshop. The views expressed are those of the authors and do not necessarily reflect the views of the Bank of Italy, the BIS, the IFC or the other central banks and institutions represented at the event.

Changes in the lending activity of banks in Poland, including the portfolio of non-financial corporate loans

Aneta Kosztowniak[1], Economic Analysis and Research Department, Narodowy Bank Polski, SGH Warsaw School of Economics

Abstract

The study aims to identify changes in the lending activity of banks, including the loan portfolio of non-financial corporation's (NFCs) and main determinants of non-performing loans (NPLs) in Poland in the period Q1.2009.Q1.-Q4.2021. This study presents the changes of average interest on corporate loans, capital requirements and mainly regulations concerning the credit policy. The article presents the differences in the NPL rates and debt servicing costs in Poland compared to other countries of the Visegrad Group, as well as Germany and France. The author presents the results of an overview of NPL research on EU countries. In modelling the quality of the portfolio of NPLs granted to NFCs, mainly the following variables are taken into account: market and financial variables of corporations – determine the possibility of servicing loans, and variables of banking conditions – serving as capital hedging against an increase in banking risk. In the analyzed period, banks pursued a liberal policy of interest rates on loans while maintaining adequate capital requirements. The analysis of NPL changes shows that there was a long-term downward trend confirming the improvement in the quality of the portfolio of loans of NFCs in the analyzed period. However, the last quarters (during the COVID pandemic), brought an increase in the NPL ratio, respectively: Q2.2020 (8.7%) and Q4.2020 (9.0%). Results of the impulse function confirmed, that the NPLs showed declining trends in response to impulses from: NPL's own changes, GDP, CPI, WIBOR, ROAC, GFCF, TOFSP and increasing trends in response to changes: CROAC, GTPR, AIRCL, CAR and CRofCR. Results of variance decomposition indicate that the main pillar of the explanation of NPL changes were: GDP, GFCF as well as CPI and WIBOR. Also, the results of the NPLs research confirmed the pro-cyclical nature of lending activity in Poland in the verified years.

Keywords: Banks, credit policy, asset quality, loan portfolio, NPLs, NFCs, credit risk, UE, Poland

JEL classification: E4, E5, G2

[1] The views expressed in this study are the views of the author and do not necessarily reflect those of NBP.

Contents

1. Introduction

The bank's credit policy is adjusted to its specificity and changing economic conditions, while maintaining the security of loan portfolio management. In terms of risk assessment in the banking sector, the Basel regulations are of great importance (Basel Committee on Banking Supervision (2014). An important group of instruments used to mitigate credit risk are exposure concentration limits: internal (created by banks) and external (supervisory), which are defined in legal regulations (including numerous directives.

A significant problem related to the lending activity is the quality of the loan portfolio. The quality of the loan portfolio depends on the exposure to banking risks, especially credit risk. Among the credit risk factors, there are internal factors – endogenous inside business entities and external factors – endogenous in the environment of enterprises and independent of them. The bank's credit policy and credit portfolio management are adjusted to the internal and external factors (independent from them.

Among the many reasons for the quality of the portfolio, the following should be mentioned:

- overall increase in financial risk in the economy,
- sudden changes in the economy, resulting on the one hand in the need for quick adjustments of all business entities, and on the other hand – reducing the possibility of hedging against risk,
- increasing number of bankrupting enterprises, which results from the increase in the number of companies established in order to obtain high ad hoc profits, often on speculative transactions, increasing risk in foreign trade due to the increase in the number of heavily indebted countries and with a high inflation rate,
- growing competition on the banking services market, limiting the banks' ability to choose customers.

When analyzing credit risk, it is important to distinguish between individual risk, portfolio risk and risk of individual client (natural person) from the credit risk of institutional client (enterprise). Individual assessment of the creditworthiness of enterprises is determined on the basis of many financial indicators. In addition, banks for internal needs forecast changes in the quality of loans, for example to enterprises, using: credit exposures, the results of corporate financial statements and numerous macroeconomic indicators. One of the final effects of the assessment of banks' lending policies is changes in the portfolio of non-performing loans (NPLs).

2. Lending activity, capital requirements and regulations of banks in Poland

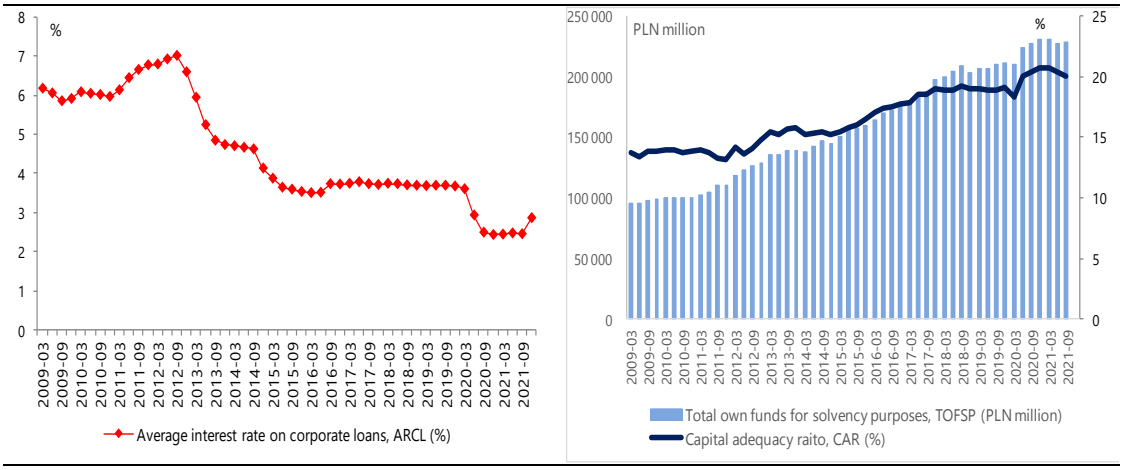
In the years 2009-2021, the credit policy of banks in Poland consisted of:

- on the one hand, the liberalization of interest rates on loans for private and institutional clients, including NFCs – mainly since 2012 – by lowering interest rates on loans,
- on the other hand, increasing the capital requirements of banks, including increasing the capital adequacy ratio and reserves for securing credit risk – which was also served by national recommendations (Polish Financial Supervision Authority, PFSA) and numerous EU directives.

In the period Q3.2012-Q3.2021, the average interest rate on corporate loans fell from 7.0% to 2.4%. Only in Q4.2021 these rates were raised to 2.9% due to the increase in inflation (consumer price index, CPI) (Figure1, left panel). In terms of capital requirements and securing capital adequacy, banks systematically raised them. Total own funds for solvency purposes (TOFSP) grew from PLN 95,692 million to PLN 228,037 million. These capitals made it possible to maintain the capital adequacy systematically growing, from 13.7% in Q1.2009 to 20.0% in Q3.2021 on average in banks in Poland (Figure1, right panel).

Average interest rate on corporate loans (left panel), the total own funds for solvency purposes and the capital adequacy ratio (right panel) in Poland in the period of Q1.2009-Q4.2021 (%, PLN million)

Figure 1



Sources: Author`s compilation based on NBP 2022).

In the case of Poland, it is worth paying attention to the numerous recommendations of the PFSA regarding the lending policy of banks, including the quality of assets (KNF, 2022):

- Recommendation M – concerning operational risk management in banks.
- Recommendation P – concerning the management of banks' liquidity risk.

– Recommendation R – concerning the principles of identifying balance sheet credit exposures that are impaired, determining: impairment losses on balance sheet credit exposures and provisions for off-balance sheet credit exposures.
– Recommendation R – concerning the principles of credit exposure classification, estimation and recognition of expected credit losses and credit risk management / Recommendation R comes into force on 1 January 2022.
– Recommendation S – concerning good practices in the management of mortgage-secured credit exposures.
– Recommendation S – concerning good practices in the management of mortgage-secured credit exposures.
– Recommendation T – concerning best practices in managing the risk of retail credit exposures.
– Recommendation U – concerning good practices in the field of bancassurance.
– Recommendation W – concerning model risk management in banks.
– Recommendation W – on model risk management in banks.
– Recommendation Z – concerning the principles of internal governance in banks.

The above-mentioned recommendations and supervision of banks in Poland in terms of their implementation by the PFSA significantly improve the quality of the lending policy, and thus the level of NPLs.

Systematic lowering of interest rates on loans to corporations as well as an increase in capital requirements and securing capital adequacy on the part of banks – to legal regulations (directives, numerous recommendations) – guaranteed an appropriate credit policy and credit risk protection. Due to these actions, there were no bank failures in the commercial banking sector in Poland

3. Non-performing loans (NPLs) – regulations and recommendations

A bank loan is considered non-performing when more than 90 days pass without the borrower paying the agreed installments or interest. According European Central Bank (ECB) – the NPLs are also called "bad debt" (ECB, 2020a).

The ECB requires asset and definition comparability to evaluate risk exposures across euro area central banks. The ECB specifies multiple criteria that can cause an NPL classification when it performs stress tests on participating banks.

The ECB has performed a comprehensive assessment and developed criteria to define loans as nonperforming if they are:

– 90 days past due, even if they are not defaulted or impaired
– Impaired with respect to the accounting specifics for U.S. GAAP and International Financial Reporting Standards (IFRS) banks
– In default according to the Capital Requirements Regulation (CRR).

The increase in the NPL ratio proves the deterioration of the lending policy. If a bank has too many bad loans on its balance sheet, its profitability will suffer because it will no longer earn enough money from its credit business. However, limiting lending on the part of banks means limiting the sources of financing investments among enterprises and, further, increases unemployment in the economy.

Asset quality monitoring is a key area of supervision in banks, along side liquidity and profitability. The asset quality analysis mainly involves calculation:

– NPLs to total loans,

– NPLs less provisions to capital,

– Sectoral distribution of loans to total loans.

NPLs may affect financial stability as they weigh on the viability and profitability of the affected institutions and have an impact, via reduced bank lending, on economic growth. More specifically, high stocks of NPLs can weigh on bank performance through two main channels:

– NPLs generate less income for a bank than performing loans and thus reduce its profitability, and may cause losses that reduce the bank's capital. In the most severe cases, these effects can put in question the viability of a bank, with potential implications for financial stability.

– NPLs tie up significant amounts of a bank's resources, both human and financial. This reduces the bank's capacity to lend, including too small and medium-sized enterprises, which rely on bank lending to a much greater extent than larger companies. In turn, this negative effect in terms of credit supply also reduces the capacity of businesses to invest, affecting economic growth and job creation, hence creating a tangible effect on the real economy (European Commission Services, ECS, 2020).

Due to the multithreaded scope of portfolio quality in banking activity, the scope of legal regulations, including monitoring, is also extensive. Among the regulations of the European Commission (EC) in the field of financial supervision and management, it is worth mentioning (EC, 2022):

– Financial conglomerates - Directive (2002/87/EC)

– Banking prudential requirements - Directive 2013/36/EU

– Banking prudential requirements - Regulation (EU) No 575/2013

– Bank recovery and resolution - Directive 2014/59/EU

– Deposit guarantee schemes - Directive 2014/49/EU

– Credit rating agencies - Regulation (EC) No 1060/2009

– Prudential supervision of investment firms - Directive (EU) 2019/2034

– Prudential supervision of investment firms - Regulation (EU) 2019/2033.

Supervision of the quality of loan portfolio (including NPLs), is one of the key areas of risk reduction in the European banking sector. European Council notes that the financial crisis and ensuing recessions, together with structural factors, accompanied by inadequate loan origination practices, have left the banks in some Member States with high ratios of NPLs.

The Commission and other EU authorities have long highlighted the urgency of taking the necessary measures to address the risks related to NPLs (ECS, (2019). In order to reduce the high NPL stocks, the EU agreed on a comprehensive set of measures outlined in the "Action Plan to Tackle NPLs in Europe" (European Council, 2017), which is currently being implemented. The ongoing decline of NPLs has been and continues to be one of the key areas for reducing risk in the European banking sector. Still, high NPL ratios remain an important challenge, for some (EC, 2019, June 12; EC, 2019, July 11).

Monitoring the quality of the corporate loan portfolio in the banking sector results from prudential regulations. As part of its package of proposals on NPLs put forward in March 2018, the Commission proposed a Regulation amending the CRR (Regulation EU 575/2013, European Parliament, 2013), introducing a 'statutory prudential backstop' in order to prevent the risk of under-provisioning of future NPLs (Regulation EU, 2019/630, European Parliament, 2019). The regulation was adopted in April 2019 and it requires banks to have sufficient loan loss coverage (i.e. common minimum coverage levels) for newly originated loans if these become non-performing exposures (NPEs). In case a bank does not meet the applicable minimum coverage level, it has to deduct the shortfall from its own funds.

In a narrow sense, the monitoring of NPLs concerns the diagnosis of the quality of the banking portfolio in terms of many financial indicators (Annex Table 1, IMF, 2003, May 14, p. 12).

4. Review of research in the field of NPLs

Many researchers analyze changes in NPLs taking into account the impact of many macroeconomic and banking variables. In the group of macroeconomic factors are commonly studied: real GDP growth, value of GDP/GDP per capita, the exchange rate, interest rates and the level of inflation. The results confirm that: real GDP growth usually translates into a higher level of income, improving the financial standing of borrowers and decreasing NPLs. When an economy is below normal conditions or in a recession, NPL levels may rise due to the ensuing rise in unemployment, and borrowers face severe debt repayment difficulties (Salas and Suarina, 2002; Ranjan and Dhal, 2003; Fofack, 2005; Jiménez and Saurina, 2005; Thalassinos et al., 2015). Exchange rate fluctuations may have a negative impact on the quality of assets, especially in countries with a large amount of foreign currency loans. The same applies to interest rate increases, particularly in the case of loans with flexible interest rate (Louzis et al., 2012; Zaman and Meunier, 2017). However, on the one hand, higher inflation may ease debt compensation by affecting the real value of unpaid credit, while on the other hand it may also reduce the real income of unprotected borrowers. In countries where credit rates are flexible, higher inflation may lead to higher rates resulting from monetary policy actions to fight inflation (Nkusu, 2011).

Klein (2013) for NPLs in Central, Eastern and South-Eastern European countries (CESEE) in 1998-2011 confirmed that NPLs responded to macroeconomic conditions, i.e., unemployment, GDP growth and inflation, and that high NPLs in these countries have a negative effect on economic recovery. According to Mazreku et. al. (2018) for 10 transition countries (Central and Eastern Europe, CEE) in 2006 and 2016,dynamic panel estimates show that GDP growth and inflation are both

negatively and significantly correlated with the level of NPLs, while unemployment is positively related to NPLs. Export growth shows largely insignificant results, indicating that NPLs in the sample are mainly influenced by domestic conditions rather than external economic shocks. Vogiazas and Nikolaidou (2011) investigate the determinants of nonperforming creditors in the Romanian banking sector during the Greek crises (2001-2010) and find that inflation and external GDP information influence the credit risks of the banking system in the country. According to Hada et.al.(2020), the exchange rates (mainly EUR, USD and CHF), unemployment rate and inflation rate had a significant impact on NPLs in the Romanian banking system in the period 2009-2019.

Among the banking variables that define NPLs, research focuses on return on assets (ROA), bank efficiency, and bank capital. However, the specificity of each bank and its customers are very important for NPL changes. For example, Godlewski (2008) investigates the association between NPLs and return on assets (ROA) and states that the lower the rate of ROA, the higher the NPLs and vice versa. Boudriga et al. (2010) confirm from their study that there is a negative association between ROA and NPLs. They conclude that when the ROA decreases, then a bank starts to make investments in high-risk projects and as a result the level of NPLs rises. Dimitrios et al. (2016) investigate the various determinants of NPLs in the euro banking system and conclude that ROA has a significant impact upon NPLs. An insufficient control of the loan portfolio (including short-term loans) increases risk and NPLs. Fiordelisi et al. (2011) examine the various factors that increase the risk level in the EU banks and conclude that a declining efficiency hikes the risk level of banks in future. Furthermore, efficiency and performance factors have influence on NPLs in the Greek banking sector (Louzis et al., 2012). Rachman et al. (2018) state that operating efficiency does not influence NPLs.

The effect of bank capital on NPLs works in the opposite direction. For one part, incentivised managers of low capitalized banks tend to get involved in high-risk investments and give loans that are issued without proper credit rating and monitoring (Keeton, 1999). For another part, banks with a high level of capital tend to give loans easily as they know that owing to these loans banks are not going to be bankrupt and fail; therefore, banks are highly engaged with these kinds of risky credit activities suggesting a positive association between capital and NPLs (Rajan,1994). Moreover, the capital adequacy ratio (CAR) shows the ability of an organization to face abnormal losses and to survive that situation. Makri et al. (2014) also state that there is a negative association between CAR and NPLs. Constant and Djiogap et. al. (2012) claim that NPLs and CAR have a positive association with each other. Bank profitability and sustainability can only be provided through a proper flow of interest income generated through the lending function. However, since banks are no longer able to generate enough interest income through classical safe credit and are required to maintain reserves in the form of provisions to cover for eventual loan losses, bank capital decreases together with their health, which is becoming fragile, increasing the trend of NPLs. Therefore, banks are required to take proactive action to deal with the phenomenon of a poor choice of borrowers by identifying and understanding the macroeconomic factors that contribute to the rise of classified credit in the banking system (Anjom and Karim, 2015).

According Paudino et. al. (BIS, 2017) the resolution of NPLs that have reached systemic levels is complex and costly. Bank NPL problems tend to emerge after credit booms or protracted periods of low growth in structurally weak financial

systems. NPLs crowd out new lending, eroding both the profitability and solvency of banks. When high NPL levels affect a sufficiently large number of banks, the financial system stops functioning normally, and banks can no longer provide credit to the economy. A prompt recovery can be obstructed by impaired market functioning and coordination failures among banks. In such circumstances, authorities usually step in to lead the crisis response. To this end, they can deploy a variety of resolution instruments, although these typically require a large amount of resources and take time to deliver results.

Moreover, results of Baudino and Yun show that the resolution toolkit used by the authorities has remained broadly unchanged for several decades in Europe (see also Iwanicz-Drozdowska, 2015), and the United States. Success of resolution policies varies from case to case. Important role paly structural banking sector conditions, the type of problem assets, the fiscal space for public sector intervention, and legal and judicial frameworks for NPL resolution. These country-specific characteristics determine how far specific resolution options may be applicable and effective in one country but not in another (see also ECB, November 2020b).

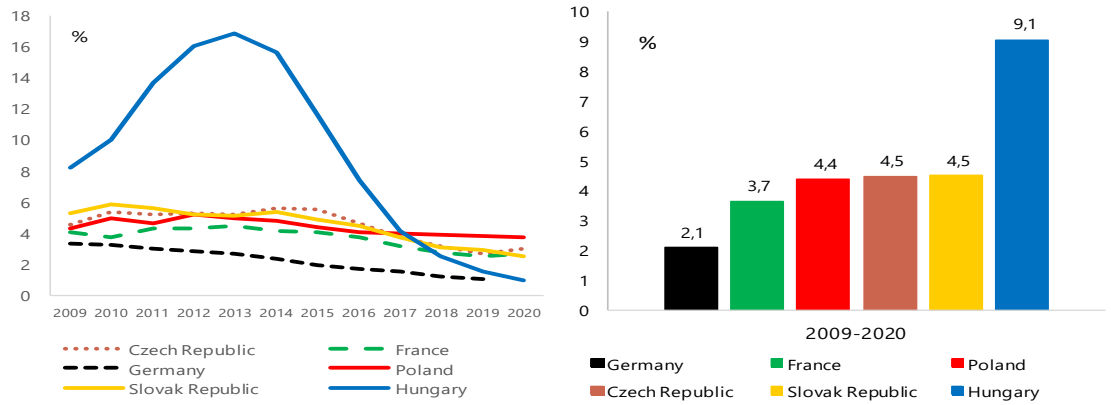
5. Differences in the NPLs between EU countries and the structure of the loan portfolio of NFCs in Poland

The bank non-performing loans to total gross loans according to the World Bank (2021) show significant differences in the banking sectors of EU countries (e.g. 27.0% Greece, 15.0% Cyprus, 5.8 % Bulgaria, 4.9% Portugal, 3.7% Poland, 2.93% Czech Republic, 2.71% France, 2.53% Slovak Republic, 1.1% Germany and 0.93% in Hungary in 2020).

The differences in the average NPL ratio (e.g. for the years 2009-2020) reached several percentage points between the banking sectors. The lowest level of NPL in the presented period was maintained by Germany (2.1%), France (3.7%), Poland, the Czech Republic and Slovakia (4.4% -4.5%) compared to the highest level in Hungary (9.1%) (Figure 2).

Bank non-performing loans to total gross loans in selected countries in 2009-2020 (%)

Figure 2

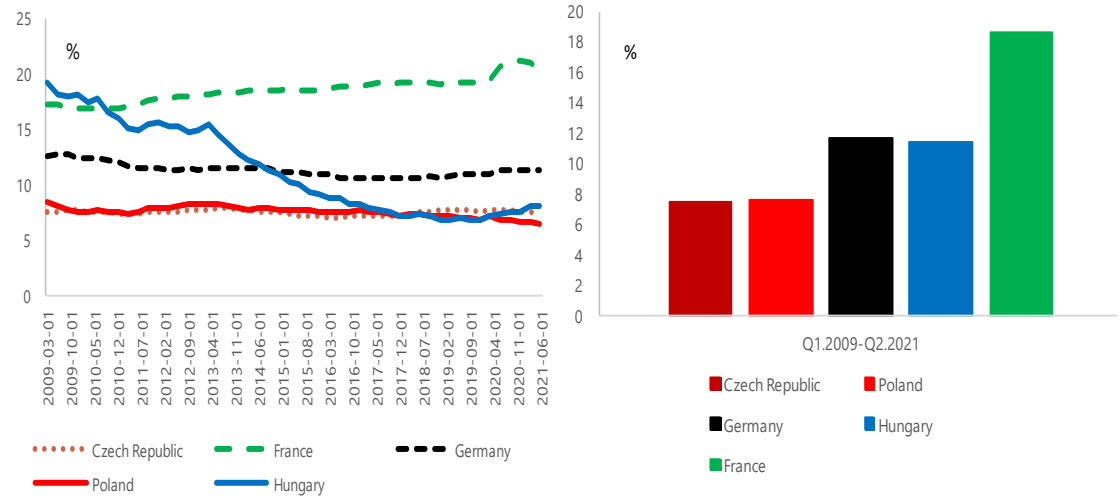


Sources: Author`s compilation based on WDI 2022).

The varying quality of bank portfolios in the EU countries is also accompanied by significant differences in debt servicing costs. Lower and relatively stable debt servicing costs are usually accompanied by better portfolio quality and lower NPL values, such as in the Czech Republic, Poland or Germany (Figure 3).

Debt service ratio for the private NFCs in selected countries in Q1.2009.Q1-Q2.2021 (%)

Figure 3



Sources: Author`s compilation based on BIS (2022).

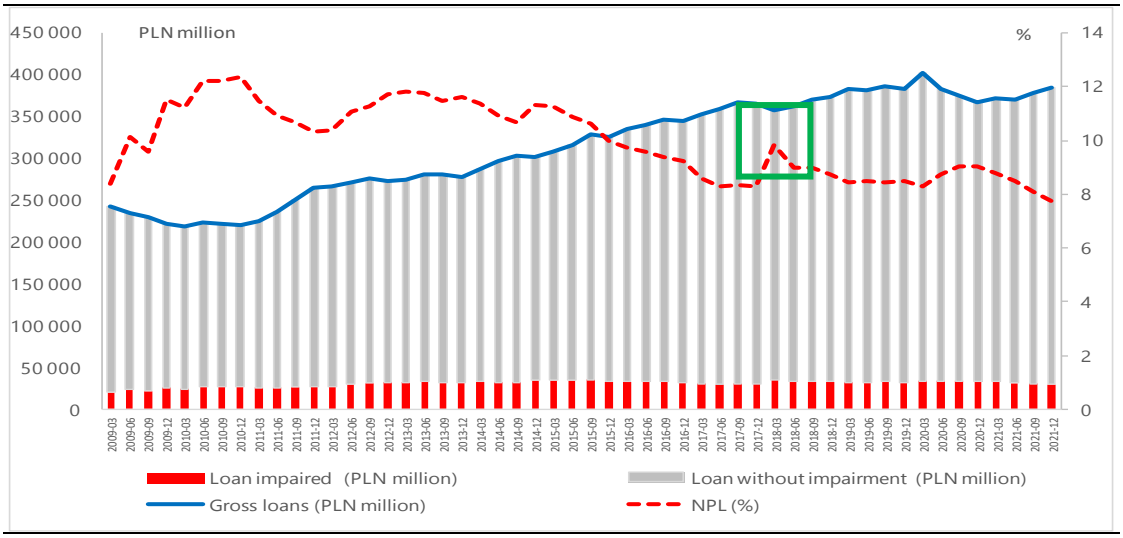
In the case of Poland, a more detailed analysis of the changes in NPLs in 2009.Q1-2021.Q4 in relation to the structure of the NFCs` loan portfolio indicates that with the gross loan increase, the NPL decreased annually.

The total value of corporate loans in the banking sector in Poland showed a general upward trend in the years Q1.2009-Q1.2020 (from PLN 242.9 million to PLN 401.6 million). Only the period 2020.Q2-Q4.2020.Q4 brought a decrease in the total value of loans (PLN 383.5 million and PLN 366.9 million) and re-growth. The NPL ratio showed quarterly fluctuations, however generally it showed a downward trend in the period Q4.2010.-Q1.2020 (from 12.3% to 9.4%), and next quarter decreased in the Q4.2021 (7.7%[2] (Figure 4).

[2] The decline in total loans was also due to a decline in demand for loans from borrowers due to the uncertain macroeconomic situation related to the COVID-19 pandemic.

Changes of loans impaired and without impairment of non-financial corporations in Poland in the period of Q1.2009-Q4.2021 (%, PLN million)

Figure 4



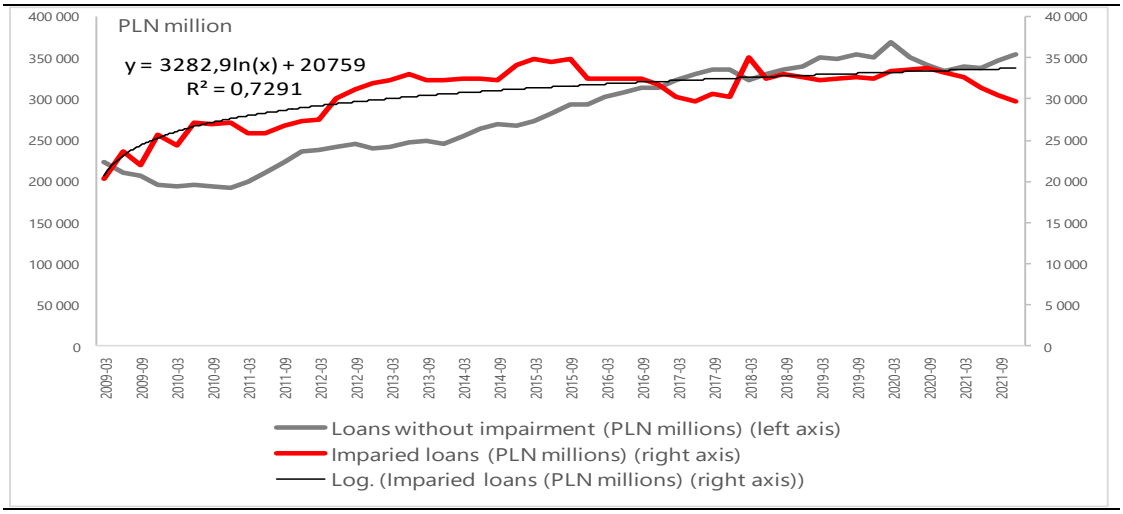
Note: The increase in NPL in the period Q4.2017-Q2.2018 – is the result of changes introduced in the classification of impaired receivables. The anomalies shown in the box in the chart are the result of changes (in the qualification of receivables to phase 3 / impaired) in the mandatory reporting of banks to the NBP (FINREP) and bank adjustments related to the obligation to include in the gross carrying amount also interest on receivables included in the phase 3. After about six months, a significant part of this interest was written off the balance sheet and charged to provisions.

Source: The author`s compilation based on NBP (2022).

Despite the fact that the value of loans generally increased, the dynamics of growth of loans without impairment was weaker in the period 2009-2021. The indicated increased in the NPL ratio in the period Q2-Q4.2020 (8.7%-9.0%) was results from quickly decreased in loans without impairment (from PLN 350.0 million to PLN 333.8 million) than impaired loans (PLN 33.5 million to PLN 33.2 million) (Figure 5).

Changes of the impaired loans and loans without impairment of NFCs in Poland in the period of Q1.2009-Q4.2021 (%, PLN millions)

Figure 5



Sources: Author`s compilation based on NBP (2022).

The indicated changes in the loan portfolio (Q2.–Q4.2020) and increases in NPL rates were mainly caused by the reduction of economic activity and, consequently, lower income. While in Q4.2019 the value of gross revenues from the total activity of corporations in Poland amounted to PLN 3 235 515.6 million, it decreased to PLN 786 700.6 million in the Q1.2020. The following quarters saw a slow increase in this revenues (Central Statistical Office, CSO, 2022). With the outbreak of the Covid-19 pandemic, additional regulatory requirements were imposed on banks to maintain security in the banking sector (BIS, 2020).

6. Research procedure - mainly determinant of NPLs of NFCs in Poland

The importance of diagnosing changes in NPLs of NFCs in Poland results, apart from the legal obligations of banks, also from the role of this segment of loans. The share of corporate loans in the structure of the gross loan portfolio was 57%. This means that any changes in this portfolio had a significant impact on the entire loan portfolio (NBP, 2022).

The NPL rate is calculated as the ratio of the non-performing loans (impaired loans) and advances of non-financial corporation to the gross value of total loans and advances of these corporations (NBP, 2020).

$$NPL\ ratio\ = \frac{Non-permorming\ loans}{Total\ loans} \quad (1)$$

In this study author made an attempt to assess the quality of the portfolio of loans granted to non-financial corporations, therefore, respectively, impaired loans and total loans granted to these corporations (included in the so-called phase III, portfolio B) were taken into account.

In modelling the quality of the portfolio of NPLs granted to NFCs, mainly the following variables are taken into account: market and financial variables of corporations – determine the possibility of servicing loans, and variables of banking conditions – serving as capital hedging against an increase in banking risk.

In order to analyse the relationship between changes in NPL ratio and chosen variables a final formula for the NPL function was developed:

$$NPL_{\ t} = \propto_0 + \ \propto_1 GDP_t + \propto_2 CPI_t + \propto_3 WIBOR_t + \propto_4 \ ROAC_t + \propto_5 \ CROAC_t + \propto_6 GFCF_t + \propto_7 \ GTPR_{\ t} + \propto_8 \ AIRCL_{\ t} + \propto_9 \ CAR_{\ t} + \ \propto_{10} TOFSP_t + \propto_{11} CRofCR_t + \xi_i \quad (2)$$

The explained variable: $NPL_{\ t}$ – The non-performed loan ratio

Explanatory variables: (Table 1) and
ξ_i – random component
t – period

Description of model and data source

Table 1

Variable	Description	Source	Expected impact on the NPLs
	Macroeconomic variables		
GDP_t	Gross domestic product	OECD	" – "
CPI_t	Consumer price index	CSO	" – "
$WIBOR_t$	Warsaw Interbank Offered Rate	OECD	"+"
	Variables of the financial standing of corporations		
$ROAC_t$	Revenues from the overall activity of corporations	CSO	"" – ""
$CROAC_t$	Costs of obtaining revenues from the overall activity of corporations	CSO	"+"
$GFCF_t$	Gross fixed capital formation	CSO	" – "
$GTPR_t$	Gross turnover profitability ratio	NBP	"
	Banking variables		
$AIRCL_t$	Average interest rate on corporate loans	NBP	"+"
CAR_t	Capital adequacy ratio	NBP	in line with changes in the NPL ratio
$TOFSP_t$	Total own funds for solvency purposes	NBP	
$CRofCR_t$	Capital requirements of credit risk	NBP	

Sources: The author`s compilation based on: NBP (2022), CSO (2022) and OECD Internet databases (2022).

The methodology of changes in the quality of the loan portfolio corresponds to the methodologies used by central banks, e.g. by NBP and IMF (2003), Matthewes, Guo & Zhang (2007), Maggi & Guida (2010). The study period includes 52 quarters data for the period Q1.2009–Q4.2021, used the first differences.

In this study, methods are used known from literature on international economics and international finance and econometric methods like the VECM model (Vector Error Correction Method) including the impulse response functions and forecast error variance decomposition analysis.

The data verification procedure and the selection of the analysis method included: ADF test, KPSS stationary test, VAR inverse root, the Engle-Granger and Johanson test and lag order (AIC, BIC, HQC criteria). In order to verify correctness of the VECM model results: two tests were carried out verifying the Autocorrelation Ljung-Box Q' test, and ARCH test. Co-integration was verified by means of the Engle-Granger and Johansen tests which confirmed the occurrence of co-integration and thus justified the use of the VECM model for the lag order 2 and co-integration of order 1.

In accordance with the Granger representation theorem, if variables y_t and x_t are integrated to the order of I (1) and are co-integrated, the relationship between them can be represented as a vector error correction model (VECM) (Piłatowska 2003).

The general form of the VECM can be written as:

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots + \Gamma_{k-1} \Delta Y_{t-k+1} + \pi Y_{t-k} + \varepsilon_t = \\ = \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \pi Y_{t-k} + \varepsilon_t, \quad (3)$$

where:

$$\Gamma_i = \sum_{j=1}^{i} A_j - \mathrm{I}, \qquad i = 1, 2, \ldots, k-1, \ \Gamma_k = \pi = -\pi(1) = -\left(\mathrm{I} - \sum_{i=1}^{k} A_i\right)$$

and I is a unit matrix.

7. Empirical results - impulse response functions and variance decompositions

Analysis of the NPL response to impulses from the explanatory variables confirmed that the strength of the influence of these impulses increased over time. The impact of explanatory variables increased especially from the 4th-8th quarter, showing changes (positive / negative) in the following quarters.

The NPL showed the following reactions (responses) in the end 20th quarter:

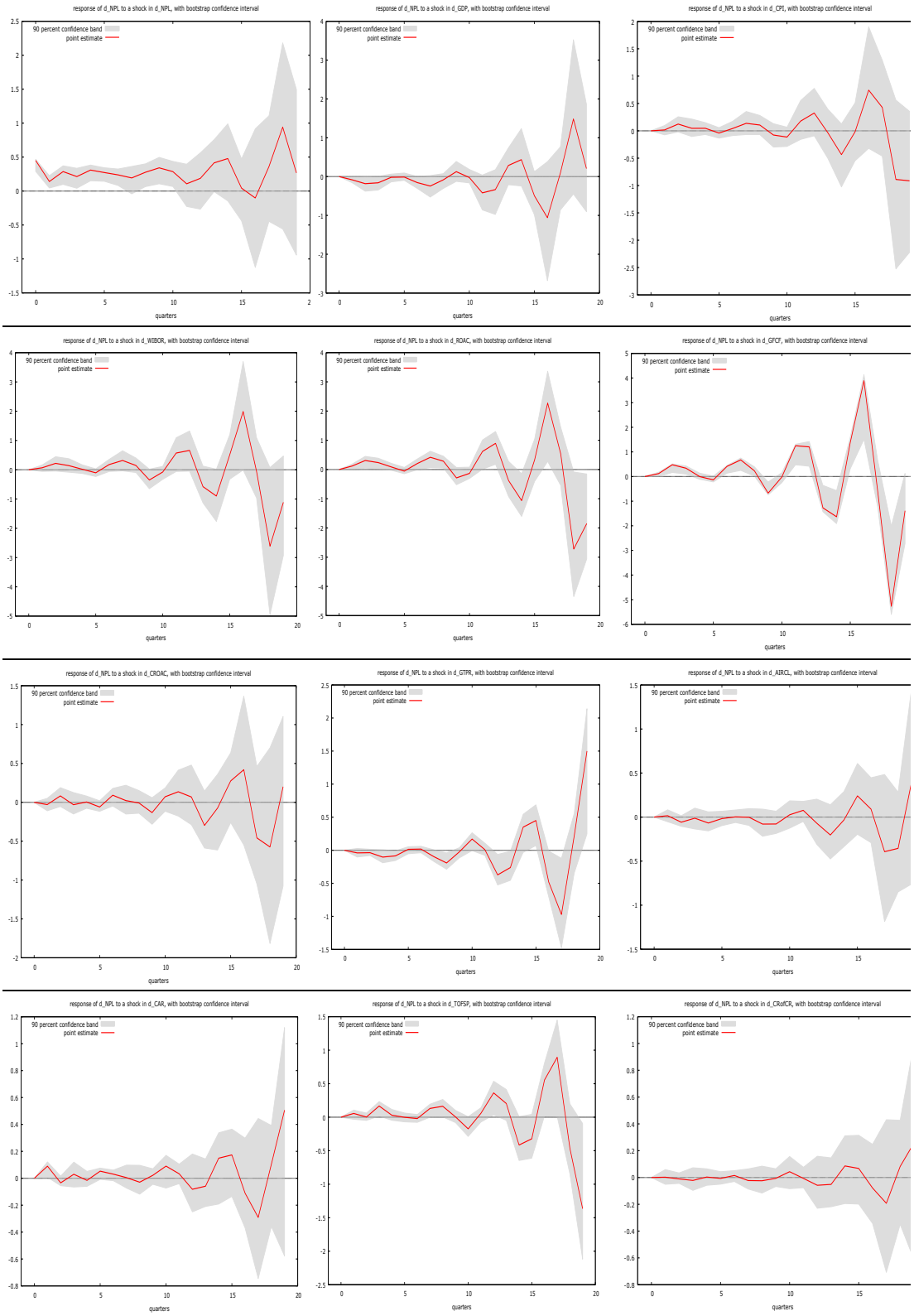
– The NPLs showed declining trends in response to impulses from: NPL's own changes, GDP, CPI, WIBOR, ROAC, GFCF, TOFSP.

– The NPLs showed increasing trends in response to changes: CROAC, GTPR, AIRCL, CAR and CRofCR (Figure 6).

The analysis of the decomposition of explanatory variables shows, in turn, that the NPL rate was significant in explaining the changes in the first period: by own changes (100.0%), in the 2nd period own NPL (65.5%), GDP (27.9%), CAR (2.8%), CROAC (1.4%) and TOFSP (1.3%) In the 8th period decreased rate of explanation own NPL (1.5%), increased GDP (94.33) and TOFSP (2.8%). Finally, in the 20th period this rate of explanation was stronger on the side of GDP (95.0%), own NPL (1.5%), GFCF (0,7%), CPI (0.1%) and also WIBOR (0.1%). This means that the main pillar of the explanation of NPL changes were changes in GDP (i.e. changes in the business cycle) and investment expenditure (GFCF) as well as CPI and WIBOR (Figure 7).

The impulse response functions (summary statement), forecast horizon 20q, include bootstrap confidence interval 1-alfa=0.90 (shaded area)

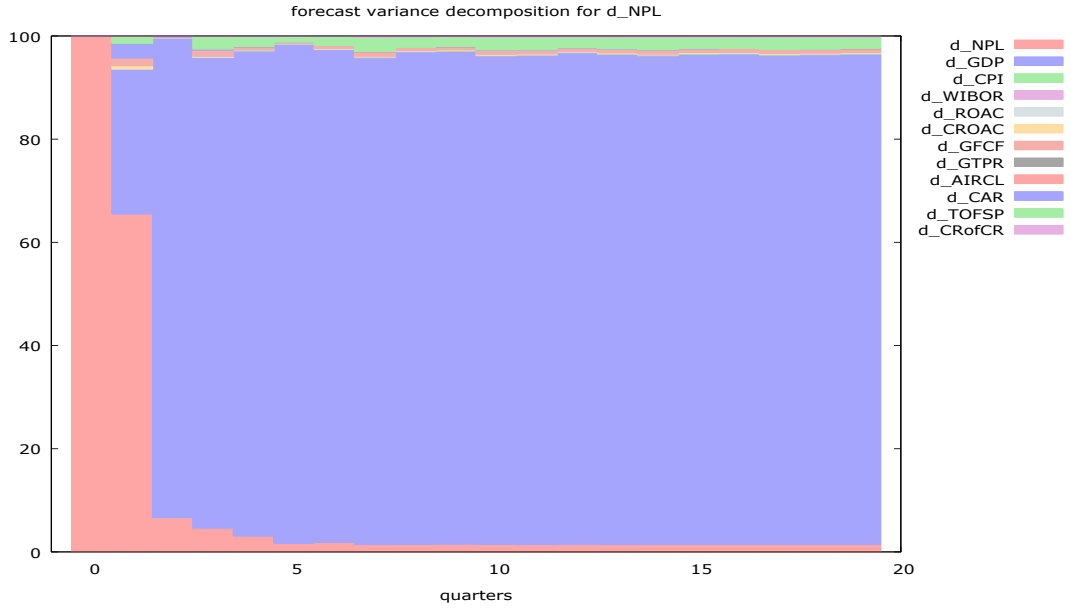
Figure 6



Sources: Author`s compilation calculations.

Variance decomposition for the NPL variable

Figure 7



Sources: Author`s calculations.

8. Conclusions and way forward

In the analyzed period, banks pursued a liberal policy of interest rates on loans while maintaining adequate capital requirements. The analysis of NPL changes shows that there was a long-term downward trend confirming the improvement in the quality of the portfolio of loans of non-financial companies in the period Q1.2009–Q4.2021. However, the last analysis quarters (during the COVID pandemic), brought an increase in the NPL ratio, respectively: Q2.2020 (8.7%) and Q4.2020 (9.0%). Whereas, in the entire period Q1.2009–Q4.2021, the structure of the loan portfolio in the Polish banking sector showed stable levels.

Te results of the response function indicate negative NPL responses (in the end 20th quarter) to impulses (earlier) own NPL fluctuations, GDP, CPI, WIBOR, ROAC, GFCF and TOFSP. The NPLs showed increasing trends in response to changes: CROAC, GTPR, AIRCL, CAR and CRofCR. The results of variance decomposition indicate that the main pillar of the explanation of NPL changes were: GDP (i.e. changes in the business cycle) and investment expenditure (GFCF) as well as CPI and WIBOR. Also, the results of the NPLs research confirmed the pro-cyclical nature of lending activity in Poland in the verified years.

Resuming, in the period 2009–2021 there was a long-term trend of improving the quality of the loan portfolio of NFCs, which was mainly explained by market (macroeconomic factors). Taking into account the implementation of prudential standards by banks in Poland, resulting from EU directives and numerous recommendations of the Polish Financial Supervision Authority, it should be stated that banks conducted a proper credit policy (they took care of the quality of assets). Moreover, the relatively liberal monetary policy of the NBP (in terms of the basic

interest rates) in the last decade and the maintained GDP growth rate also contributed to lowering the NPLs.

The main problems of banking in Poland (which are mostly common problems of EU countries) are:

- Adaptation to new customer expectations
- The need for new financing
- Macroeconomic situation
- Possible rebound in banking sector profits?
- Consequences of the Court of Justice of the European Union (CJEU) judgment on loans in Swiss francs
- Cybersecurity and efficiency of systems.

Annex

Role of Core and Corporate FSIs

Table 1

Banking Sector Financial Strength	*Capital Adequacy*	Tier 1 capital ratio	Assesses adequacy of highest quality capital, such as shareholder equity and retained earnings, relative to risk weighted assets
		Regulatory capital ratio	A broader measure of capital including items giving less protection against losses, such as subordinated debt, tax credits and unrealized capital gains
	Earnings and profitability	Return on equity	Assesses scope for earnings to offset losses relative to capital or loan and asset portfolio
		Return on assets	
		Interest margin to Gross income	Indicates the importance of net interest income to earnings and scope to absorb losses
		Non-interest expenses to income	Indicates extent to which high non-interest expenses weakens earnings
Banking Sector vulnerabilities	*Asset quality*	NPLs to total loans	Indicates the credit quality of banks' loans
		NPLs less provisions to capital	Shows NPLs net of provisions taken against them relative to capital
		Sectoral distribution of loans to total loans	Identifies credit exposures concentrations to particular sectors by the whole banking sector
	Liquidity	Liquid assets ratio	Assesses the vulnerability of the banking sector to loss of access to market sources of funding or a run on deposits
		Liquid assets to shortterm liabilities	
	Sensitivity to market risk	Duration of assets and liabilities	Measures maturity mismatch to assess interest rate risk
		Net open foreign exchange position to capital	Measures foreign currency mismatch to assess exchange rate risk
Corporate sector	Leverage ratio	Leverage ratio	Gives an indication of the credit risk as a highly leveraged corporate sector is more vulnerable to shocks that could impair its capacity to repay loan
	Return on Equity	Return on Equity	Indicates the extent to which earnings are available to cover losses
	Earnings to interest and principle payments	Earnings to interest and principle payments	Reveals to what extent earnings available to cover losses are reduced by interest and principle
	Net FX exposure to equity	Net FX exposure to equity	The vulnerability of the corporate sector to exchange rate changes
	Number of bankruptcies	Number of bankruptcies	Serves as an indicator of corporate sector distress

Sources: IMF (2003, May 14, p. 12). .

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NARODOWY BANK POLSKI

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Changes in the lending activity of banks in Poland, including the portfolio of corporate loans

Aneta Kosztowniak, NBP, Economic Analysis and Research Department

- This presentation should not be reported as representing the views of the National Bank of Poland.
- The views expressed are those of the authors and do not necessarily reflect those of the NBP.

Overview

I • Introduction

II • Empirical data

III • NPL - data and research procedure of cause-and-effect relationships

IV • Results – VECM model, the impulse response functions and the decomposition of variance

V • Conclusion and way forward

Introduction

A bank loan is considered non-performing when more than 90 days pass without the borrower paying the agreed installments or interest. Non-performing loans (NPLs) are also called "bad debt" (ECB, 2020).

The ECB requires asset and definition comparability to evaluate risk exposures across euro area central banks. The ECB specifies multiple criteria that can cause an NPL classification when it performs stress tests on participating banks.

The ECB has performed a comprehensive assessment and developed criteria to define loans as nonperforming if they are:

- 90 days past due, even if they are not defaulted or impaired
- Impaired with respect to the accounting specifics for U.S. GAAP and International Financial Reporting Standards (IFRS) banks
- In default according to the Capital Requirements Regulation.

The NPL rate is calculated as the ratio of the non-performing loans (impaired loans) and advances to the gross value of total loans and advances (NBP, 2020).

$$NPL\ ratio = \frac{Non-permorming\ loans}{Total\ loans} \quad (1)$$

Asset quality monitoring is a key area of supervision in banks, along side liquidity and profitability. The asset quality analysis mainly involves calculation:

- NPLs to total loans,
- NPLs less provisions to capital,
- Sectoral distribution of loans to total loans.

This monitoring is facilitated by the current assessment of the level and volatility of the indicators listed in Table 1. These statistics are published, among others by The International Monetary (IMF) under the so-called financial soundness (FSIs).

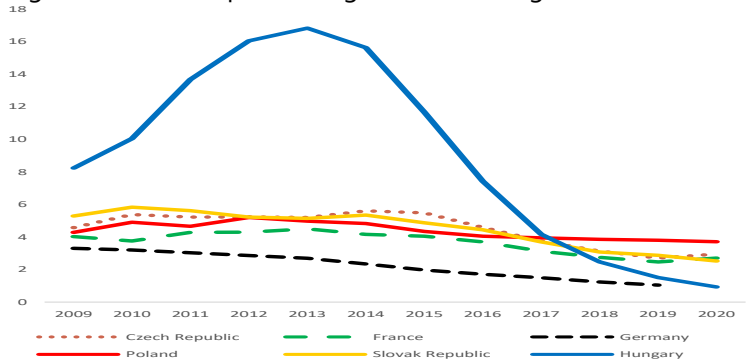
Table 1. Role of Core and Corporate FSIs

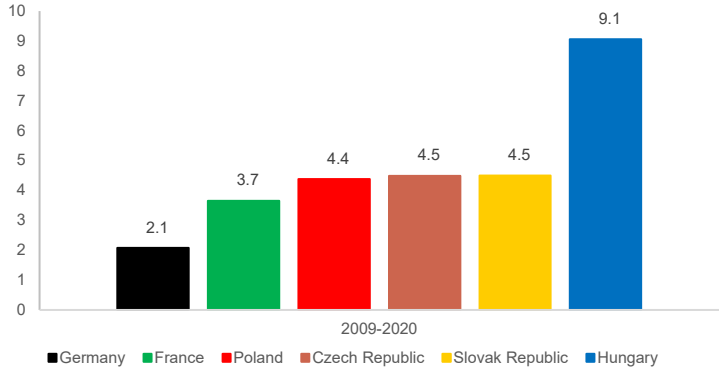
Types of FSI		Specific FSIs	Role of FSIs in Monitoring the Financial Sector
Banking Sector Financial Strength	***Capital Adequacy***	Tier 1 capital ratio	Assesses adequacy of highest quality capital, such as shareholder equity and retained earnings, relative to risk weighted assets
		Regulatory capital ratio	A broader measure of capital including items giving less protection against losses, such as subordinated debt, tax credits and unrealized capital gains
	Earnings and profitability	Return on equity Return on assets	Assesses scope for earnings to offset losses relative to capital or loan and asset portfolio
		Interest margin to gross income	Indicates the importance of net interest income to earnings and scope to absorb losses
		Non-interest expenses to income	Indicates extent to which high non-interest expenses weakens earnings
Banking Sector vulnerabilities	***Asset quality***	NPLs to total loans	Indicates the credit quality of banks' loans
		NPLs less provisions to capital	Shows NPLs net of provisions taken against them relative to capital
		Sectoral distribution of loans to total loans	Identifies credit exposures concentrations to particular sectors by the whole banking sector
	Liquidity	Liquid assets ratio	Assesses the vulnerability of the banking sector to loss of access to market sources of funding or a run on deposits
		Liquid assets to shortterm liabilities	
	Sensitivity to market risk	Duration of assets and liabilities	Measures maturity mismatch to assess interest rate risk
		Net open foreign exchange position to capital	Measures foreign currency mismatch to assess exchange rate risk
		Leverage ratio	Gives an indication of the credit risk as a highly leveraged corporate sector is more vulnerable to shocks that could impair its capacity to repay loan
Corporate sector		Return on Equity	Indicates the extent to which earnings are available to cover losses
		earnings to interest and principle payments	Reveals to what extent earnings available to cover losses are reduced by interest and principle
		Net FX exposure to equity	The vulnerability of the corporate sector to exchange rate changes
		Number of bankruptcies	Serves as an indicator of corporate sect distress

Source: IMF (2003, p. 12).

Empirical data

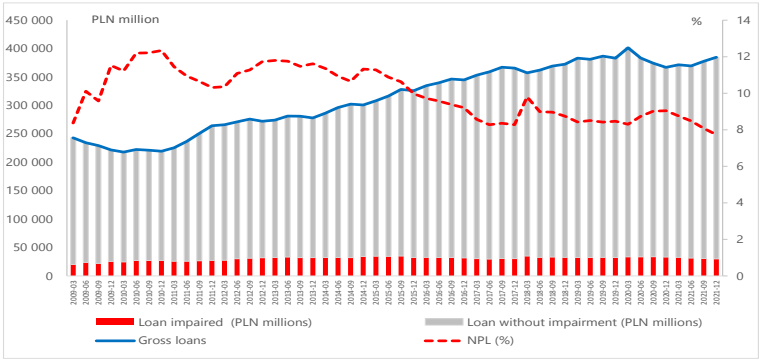
Figure 2. Bank nonperforming loans to total gross loans in selected countries in 2008-2020 (%)

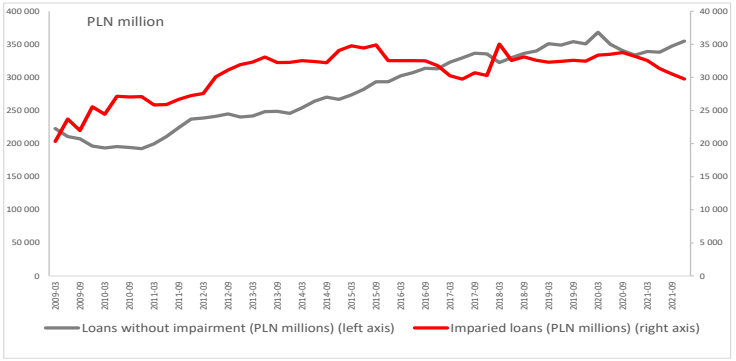




Source: WDI (2022).

Figure 3. Changes of loans impaired and without impairment of non-financial sector in Poland in the period of Q1.2009-Q4.2021 (%, PLN million)





Source: Author`s compilation based on NBP (2022), CSO (2022), OECD (2022) and Eurostat (2022).

Data and research procedure of NPL

Data: the quarters time-series data covering the period 2009:Q1-2021:Q4 (52 quarters; used the the firts differences);
Sources: NBP (2022), CSO (2022), and OECD Internet databases (2022).

The data verification procedure and the selection of the analysis method included: ADF test, KPSS stationary test, VAR inverse root, the Engle-Granger and Johanson test and lag order (AIC, BIC, HQC criteria).

In order to verify correctness of the VECM model results: two tests were carried out verifying the occurrence of autocorrelation, i.e.: Autocorrelation Ljung-Box Q' test, and ARCH test.

The final formula for the NPL function:

$$NPL_t = \propto_0 + \propto_1 GDP_t + \propto_2 CPI_t + \propto_3 WIBOR_t + \propto_4 ROAC_t + \propto_5 CROAC_t + \propto_6 GFCF_t + \propto_7 GTPR_t + \propto_8 CAR_t + \propto_9 TOFSP_t + \propto_{10} CRofCR_t + \xi_i$$

The explained variable:
NPL_t – The non-performed loan ratio

Explanatory variables:
GDP_t – Gross domestic product
CPI_t – Consumer price index
$WIBOR_t$ – Warsaw Interbank Offered Rate
$ROAC_t$ – Revenues from the overall activity of corporations
$CROAC_t$ – Costs of obtaining revenues from the overall activity of corporations
$GFCF_t$ – Gross fixed capital formation
CAR_t – Capital adequacy ratio
GTPRt - Gross turnover profitability ratio
$TOFSP_t$ – Total own funds for solvency purposes
$CRofCR_t$ – Capital requirements of credit risk
ξ_i – random component
t – period

The general form of the VECM model:

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots + \Gamma_{k-1} \Delta Y_{t-k+1} + \pi Y_{t-k} + \varepsilon_t = \\ = \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \pi Y_{t-k} + \varepsilon_t, \qquad (2)$$

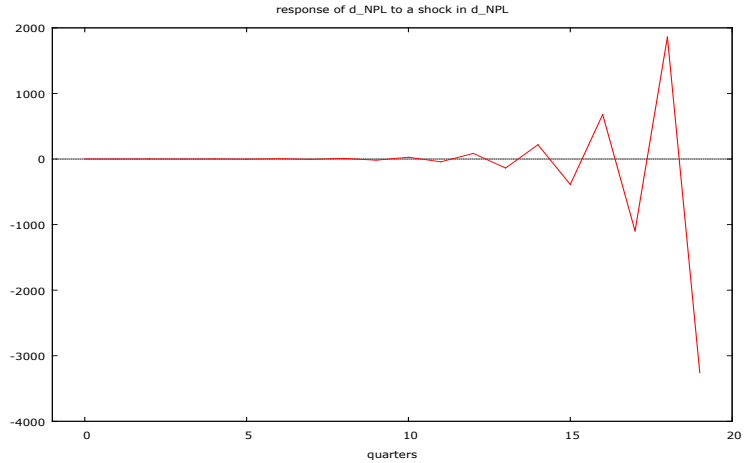
where:

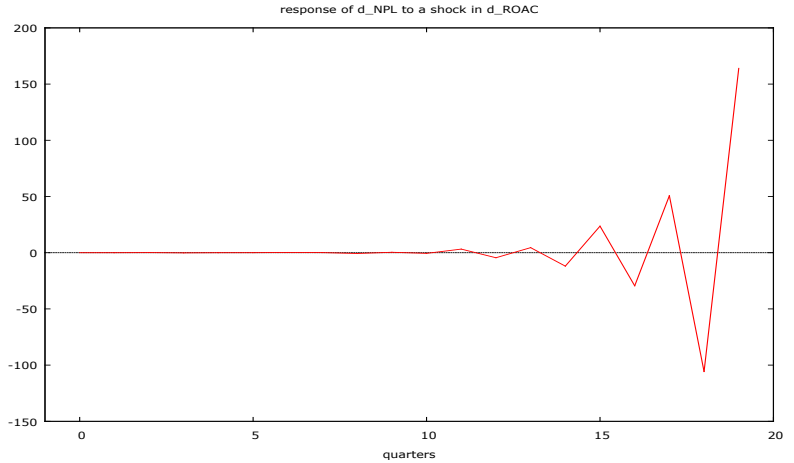
$$\Gamma_i = \sum_{j=1}^{i} A_j - \mathrm{I}, \quad i = 1,2,\ldots,k-1, \quad \Gamma_k = \pi = -\pi(1) = -\left(\mathrm{I} - \sum_{i=1}^{k} A_i\right)$$

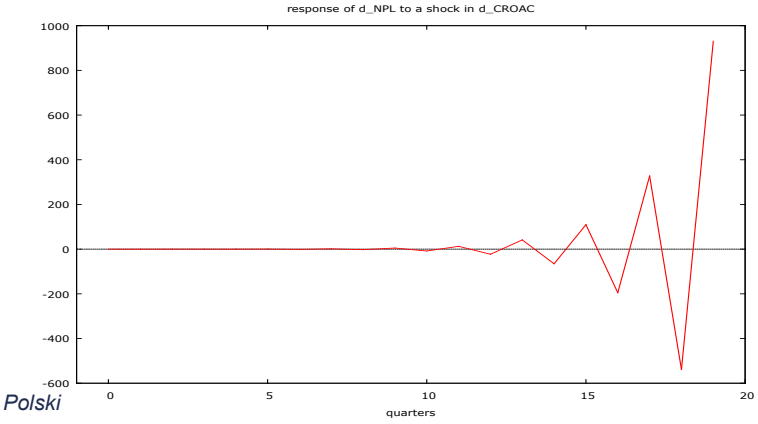
and I is a unit matrix.

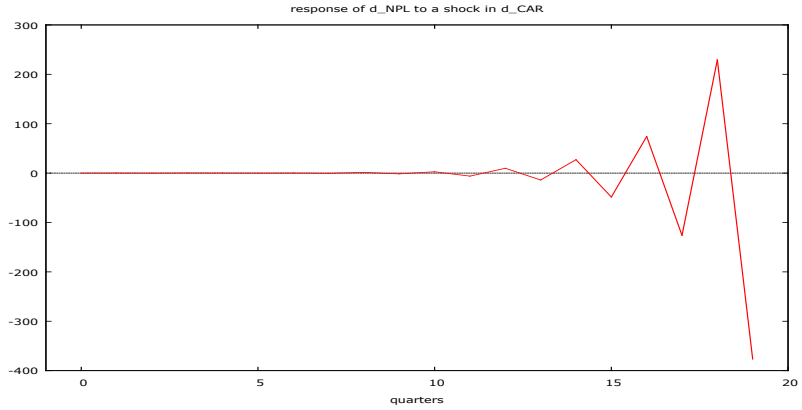
The impulse response functions

Figure 4. Forecast horizon 20q



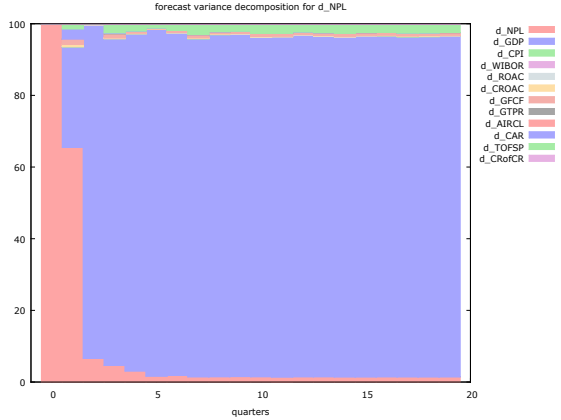


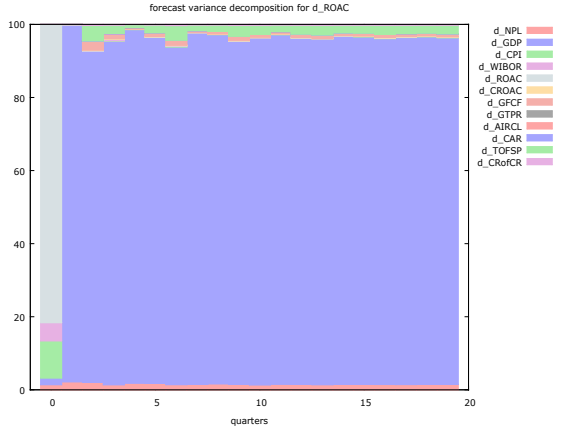


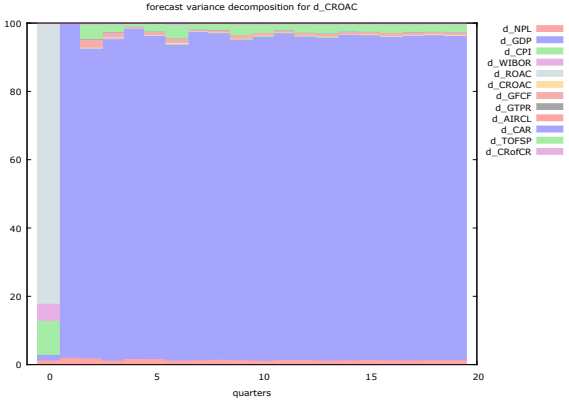


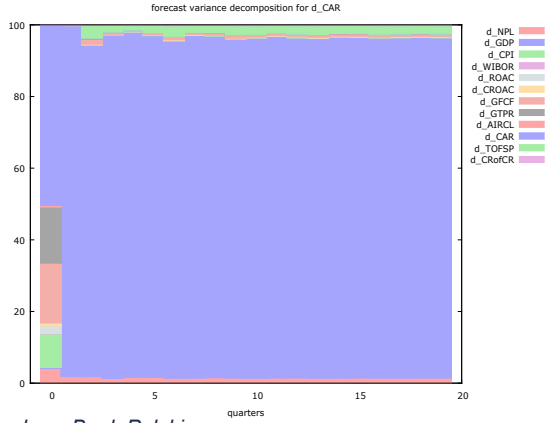
The variance decompositions

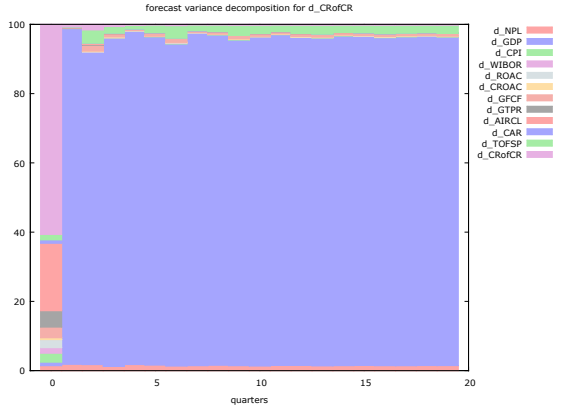
Figure 5. Forecast variance decomposition (quarters)

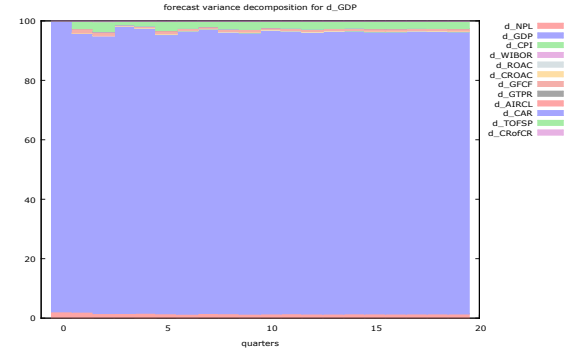












Conclusion and way forward

I
- The analysis of NPL changes shows that there was a long-term downward trend confirming the improvement in the quality of the portfolio of loans of non-financial companies in the period Q1.2009–Q4.2021. However, the last analysis quarters (COVID-19 time), brought an increase in the NPL ratio.

II
- The results of the VECM model confirmed the importance of revenues, economic situation (GDP), indicators of investments, costs of obtaining revenues on the part of corporations and total own funds on the part of banks.

III
- The results of the impulse response were confirmed by the results of the variance decomposition, indicating the importance of market and financial factors both in the volatility and the degree of explanation of NPL in the Polish banking sector. Also, the results of the NPLs research confirmed the pro-cyclical nature of lending activity in Poland in the verified years.

IV
- The results of the research confirm the importance of pursuing an investment policy focused on attracting new investments (new equity), including the so-called greenfield and on maintaining the existing ones (reinvestment of earnings).

V
- Further research should focus on the diagnosis of financial situation of corporation, the adequacy of macroprudential regulations, the credit policy on the part of commercial banks and the interest rate policy on the part of the central bank.

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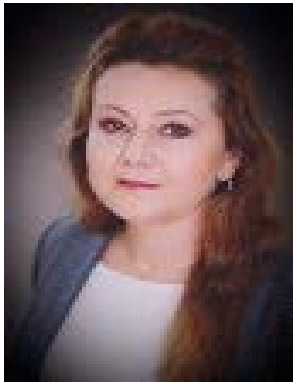
Thank for your attention



Aneta Kosztowniak

Economic Expert

Economic Analysis and Research Department

phone: +48 22 185 15 07

mobile: +48 691 034 170

e-mail: Aneta.Kosztowniak@nbp.pl; aneta.kosztowniak@wp.pl