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Loan portfolio quality and structure: implications for bank insolvency risk and crisis management tools

Krzysztof Kil*, Magdalena Kozińska#

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Abstract

The aim of this article is to verify the importance of the loan portfolio in the context of bank default risk and tools for managing bank failures. Based on the research, it was proven that the quality of the loan portfolio and the share of corporate loans in the portfolio were statistically significant negative determinants of bank insolvency risk. It was shown that banks under resolution were characterised by a higher quality of loan portfolio than banks in insolvency proceedings. The study shows that loan portfolios are treated differently in the context of crisis management depending on their quality. Healthy loan portfolios are the drivers in crisis management. In the case of toxic loan portfolios, other tools are implemented – gradual liquidation by the bankruptcy trustee or transfer to the bad bank and gradual resolution. The study also shows that, regardless of the applied tool, usually the situation of the borrowers in crisis management does not change materially (opposite to deponents).

Keywords: loan portfolio, NPL, insolvency, resolution

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* Krakow University of Economics; e-mail: kilk@uek.krakow.pl.
# SGH Warsaw School of Economics; e-mail: magdalena.kozinska@sgh.waw.pl.

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1. Introduction

In the European banking sector, efficient credit allocation is one of the basic areas of credit institutions' operations and the basis for the development of the European economy. At the same time, the examples of banking crises indicate that the materialization of credit risk may become a significant (frequently underestimated) cause of the risk of bank failure (Ghenimi, Chaibi, Omri 2017, p. 246). However, while the relationship between the quality of mortgage lending and the risk of bank insolvency has become an important area of research after the global financial crisis, the impact of loan quality on bank default risk,[1] taking into account the role of consumer credit in the loan portfolio, has been studied less frequently. In addition, the legal framework for the actions applicable to banks threatened with insolvency doesn't address directly and comprehensively the treatment of the loan portfolio and the bank's borrowers in the context of the selection and use of crisis management measures.

This framework was established in the EU after the experiences of the global financial crisis. The main legal acts applicable in this area are: Bank Recovery and Resolution Directive (BRRD), Deposit Guarantee Schemes Directive (DGSD), and the so-called Banking Communication published by the European Commission (EC). The current crisis management framework applicable to the external authorities towards banks that are failing or likely to fail consists of the following measures:

1) standard insolvency proceedings (assuming the declaration of insolvency, payout of covered deposits financed by the deposit guarantee scheme, and sale of available assets in order to cover the liabilities towards other creditors);

2) alternative insolvency proceedings (assuming the declaration of insolvency and transfer of the deposit book and potentially also the loan portfolio financed by the deposit guarantee scheme and the sale of available assets in order to cover the liabilities towards other creditors);

3) resolution proceedings (under which the resolution authority can sell, in part or in whole, the bank business, create a bridge undertaking or an asset management company, or decide to write down or convert capital or liabilities; these actions can be supported by the use of resolution funds created by ex ante bank contributions).

In exceptional circumstances, taxpayers' money can be applied to stabilize the crisis situation.

The legal framework described above puts the deposits in the centre of the supervisory and resolution authorities' interest, as both in the context of standard insolvency and resolution proceedings, covered deposits[2] must be protected.[3] Other creditors of the bank may be subject to losses. The aim of the article is to verify the importance of the loan portfolio in the context of bank default risk and tools for managing bank failures. To this end, the study aims to verify the relationship between the quality

[1] Insolvency is a state where a bank is not able to meet its obligations or its assets are lower than its liabilities (relates to the financial situation of the bank). In the context of the EU, the regulations use the notion of a bank that is failing or likely to fail (FOLTF). It should be emphasized that the notion of FOLTF includes both the insolvent and likely insolvent banks. The practical experiences show, however, that banks declared as FOLTF were always insolvent (not likely insolvent). The literature also uses the notion of failure, bankruptcy, and default. After the bank is declared insolvent, the bankruptcy proceeding can be applied as a legal procedure. The EU regulations use the notion of standard/normal insolvency proceedings. All mentioned notions (insolvent/insolvency, FOLTF, failed/failure, bankrupt/bankruptcy, and default) will be used interchangeably in the article, referring to the situation when the bank is unviable. As regards bankruptcy and (standard/normal) insolvency proceeding, these notions will also be used interchangeably. This is due to the fact that the article concentrates on the financial dimension of the topic, not its legal side.

[2] Covered deposits are deposits subject to a deposit guarantee in the amount of 100 000 euro.

[3] An analysis of the deposits' safety in the context of crisis management is presented by Zaleska (2023).

and structure of the loan portfolio and the bank default risk, as well as assess the treatment of the loan portfolios and the situation of borrowers under standard insolvency and resolution proceedings.[4]

As a hypothesis, it is assumed that the quality and structure of the loan portfolio significantly affect (1) the probability of a bank's failure and (2) its subsequent treatment or role in the application of crisis management measures.

The study used an in-depth literature review, regression analysis of panel data, and case studies. The core group of banks analysed included entities that had been subject to resolution or insolvency proceedings after 2016 (i.e. after the establishment of the current bank crisis management framework in the EU). The data on these banks were taken from the Moody's Analytics BankFocus database. The values of the control variables were obtained, among others, from the databases of the ECB, Eurostat, and the World Bank.

The article is structured as follows. After the introduction, the second point summarizes the literature connected to the credit risk and loan portfolio as factors contributing to the bank's insolvency. In the third part, the results of the quantitative analysis regarding the impact of the quality and structure of loan portfolios on the bank default risk are presented. The fourth part deals with the issue of the treatment of loan portfolios and banks' borrowers in the crisis management framework. The article ends with conclusions.

2. Loan portfolio and bank default risk and crisis management – literature review

In the context of bank insolvency, there are at least two angles of analysis that should be considered. First, how the loan portfolio contributes to the bank default risk. Second, what is the treatment of the loan portfolio in the insolvency or resolution proceedings.

In the first area, the vast majority of literature aims to identify the determinants of bad loans (non-performing loans, NPLs), which ultimately lead to the bank's failure. The available analyses allow two groups of factors that influence the level of NPLs to be identified – internal or bank-specific (e.g. Bofondi, Ropele 2011; Beck, Jakubik, Piloiu 2015) and external or macroeconomic (e.g. Ghosh 2015; Vithessonthi 2016). Pancotto, Gwilym, and Williams (2024) also indicate the idiosyncratic and systemic factors. Various studies test different determinants that may impact the level of NPLs. Cucinelli et al. (2018, pp. 27–29), for the sample of 73 Italian banks, analyse how different factors impact the deterioration of loan quality, proving that moral hazard is not a relevant factor in the case of loans unlikely to be repaid, but is relevant in the case of bad loans. At the same time, bad management (internal governance) was confirmed as a permanent determinant of the growing stock of bad loans. The hypothesis of moral hazard was also confirmed by Pancotto, Gwilym, and Williams (2024) for the group of Italian banks. They suggest that a higher level of capital is associated with a better quality of the loan portfolio. For the group of 38 most representative banks in the CEE region, it was verified that in the period 2004–2013, the main determinants of the increase in the bad loans ratio were bank size, the manifestation of the economic and financial crisis, unemployment, and the cost-to-income

[4] Research that tries to evaluate the effectiveness of the crisis management measures at all is already available, e.g. Miklaszewska and Kil (2019).

ratio (Filip 2017, pp. 210–211). Ostrowska (2023, pp. 541–556) analyses the impact of macroeconomic factors on the quality of loan portfolios in Poland in 2010–2022. She proves that GDP dynamics, public debt, as well as, especially, the unemployment rate, strongly influence the share of NPLs in the whole loan portfolio, impacting both the financial standing of banks and the situation of borrowers. A comprehensive review of research studies regarding the factors influencing NPLs is presented by Alnabulsi, Kozarević, and Hakimi (2023, pp. 111–130).

Some authors show the dependency between bad loans and bank profitability, capital adequacy, the probability of failure, and general financial stability. Fredriksson and Frykström (2019, p. 4) point out that an increase in bad loans leads to a decrease in interest income, at the same time as the administrative costs of managing the loans increase. Phung, Vu, and Tran (2022) show that NPLs are negatively related to bank efficiency. Also, Khan, Siddique, and Sarwar (2020, p. 136) prove that NPLs are negatively correlated with banks' operating efficiency and profitability. At the same time, while there is a negative relationship between NPLs and capital adequacy and income diversification, it is statistically irrelevant. Lepczyński and Penczar (2016, p. 932) point out that many studies prove that failed banks usually had a high share of non-performing loans, which confirms that the low quality of the loan portfolio is a direct factor contributing to banks' insolvency. They also cite the analyses of Berger and De Young (1997) for US banks with similar conclusions.

Some studies go one step further and show the impact of NPLs on the real economies. For example, Pancotto, Gwilym, and Williams (2024) confirm that the higher level of NPLs is adversely correlated with credit growth, which is consistent with the results of the study conducted by Resti (2017, pp. 24–25) as well as Bruno and Marino (2017, pp. 15–16). A study of 88 banking crises since 1990 conducted by Ari, Chen, and Ratnovski (2020, p. 2) also proves that a high level of NPL delays the recovery after the crisis. The cause and effect sequences in the area of bad loans, created on the basis of the literature review, are presented in Figure 1.

The second research area that is relevant in the context of crisis management and loan portfolio is the treatment of loan portfolios, especially bad loans (NPLs) in bank crisis management (i.e. within insolvency proceedings – both standard and alternative – and resolution). While a healthy loan portfolio seems to be the profitability driver and is usually further run by the bank in resolution, bridge bank, or bankruptcy trustee when managing the bankruptcy estate, a more challenging task is the management of NPLs. In this regard, NPLs are usually treated as part of so-called toxic assets. Compared to the extensive studies on NPLs' causes and implications, the literature about the management and resolution of bad loans and the functioning of bad banks[5] is definitely narrower. Dado and Klingebiel (2000) present two ways of NPL resolution. According to the first one, the stock of NPLs is taken over by another entity (private investor or asset management company, which might be privately or publicly financed). The second approach consists of active management of loan cash flows by the bank. Dimitrios (2016) presents NPL management methods, dividing them for ex ante (control/prevention from NPLs, monitoring, and active bank management of impaired assets) and ex post solutions (creation of asset management companies, debt consolidation programmes or debt purchases financed with bonds and takeover of the problematic bank). Based on experiences in Bangladesh, Amin, Chernykh, and Imam (2014) identify factors that drive the effectiveness of NPL resolution.

[5] In the literature, the notion of 'bad bank' is used interchangeably with the following notions: asset management company (AMC), asset management vehicle (AMV). Sometimes the notion of 'special purpose vehicle' is also used.

These factors are management quality (measured by the net interest margin and effectiveness ratios, which support the build-up of 'provisioning cushions') and macro-level developments (like economic growth and financial development). At the same time, governance standards and market discipline turned out not to have a significant effect on NPL resolution. In the literature on bad banks (AMCs/AMV), some space is devoted to the factors influencing the speed of resolution. Fell et al. (2017, p. 74), citing Constancio (2017) and Fell et al. (2016), point out the slow resolution of NPLs in the European Union due to information asymmetry and structural impediments. These problems might be resolved when creating AMCs, which provide a coordination role, and reduce uncertainty surrounding the profitability and solvency of banks.

The studies conducted by Brei et al. (2023) show that bad banks were more effective than state-funded recapitalizations of distressed banks. As indicated, while state recapitalizations were usually also utilized for cleaning up the balance sheets, they usually also cut down on lending. This was not a problem in the case of banks, where transfers to bad banks were implemented. Ingves, Seelig, and He (2004, p. 9) summarize the pros and cons of creating public bad banks (as a public tool for bank crisis resolution). He cites the following issues as their advantages: a vehicle for getting NPLs out of banks based on uniform valuation, allows the government to impose additional restructuring conditions when buying NPLs, centralizes resources (human, financial, collateral, etc.), allows better operational restructuring of troubled banks, and might be given special powers to facilitate restructuring. Moreover, the following disadvantages were presented: weaker management than in private companies, political pressure, quick erosion of the value of acquired assets, assets long parked not liquidated in AMC, possible deterioration of credit discipline (if assets are not actively managed), possibly higher costs compared to private solutions, and difficulties in determining the transfer prices. Gandrud and Hellerberg (2014, p. 1) draw attention to the differentiation between private and publicly-funded AMCs. According to their analyses, privately owned AMCs applied higher haircuts, which positively impact their profitability as well as help avoid the maintenance of zombie banks and zombie bad banks.

3. Impact of quality and structure of loan portfolio on risk of bankruptcy

3.1. Loan portfolio and bank risk of default

Due to the heterogeneity of previous research results on the impact of bank lending policies (manifested in particular by the quality and structure of the portfolio) on the risk of bank failure, an own study covering the years 2016–2022 was conducted. Linear regression of panel data was used to assess the statistical significance of the loan portfolios' quality and structure on the bank default risk for banks operating in EU Member States. Taking into account the completeness of the available data, statistical information for 1446 banks from 27 EU countries was used in the base model.[6] Variables used in the model were identified based on a literature review and expert judgment. Finally, the following explanatory variables, divided into three groups, as discussed in Table 1, were used:

[6] The banks covered by the analysis account for over 85% of the EU banking sector's assets. All entities for which the availability of data in the BankFocus database allowed for econometric analysis were included.

1) microeconomic control variables on the characteristics of individual banks;

2) macroeconomic and sectoral control variables, relating to the economic environment and the market model in which the banks operate in each country;

3) variables concerning the quality and structure of the banks' loan portfolios.

Due to the existence of correlations between variables and because of the risk that the model could not be correctly estimated, the variables excluded from the group of explanatory variables were: share of loans to the non-financial sector in total assets (NFLS_TA); consumer loans in relation to total loans (CONSL_TL); mortgages in relation to total loans (MORTL_TL); cost-income ratio (C_I); share of interbank market deposits in banks' sources of funding (DEP_BA), index of the quality of the bank's loan portfolio against sectoral data (NPL_B_SEC). The analysis of correlation coefficients is presented graphically in Figure 2.

The Z-score index (Z-sc), commonly used in the literature as a measure of distance to insolvency, was used as a measure of bank default risk. The index is based on the volatility of returns and the lack of adequate capital as the main sources of risk (Lown et al. 2000) and is calculated as the sum of the equity capital to assets ratio (CAR) and the return on assets ratio (ROA), divided by the standard deviation of ROA (Equation 1). Thus, the value of the Z-Score is determined by the level of capitalization and by the level and stability of profits, and can be interpreted as the distance from a default, measured by the standard deviation of profits.

$$Z\text{-}Score_t = \frac{ROA_t + CAR_t}{\sigma\left(ROA\right)} \tag{1}$$

where:

ROA_t – return on assets,

CAR_t – capital to assets ratio for year t,

$\sigma(ROA)$ – standard deviation of ROA for the whole study period.

The analysis of the changes in the value of the explanatory variable shows that it varies significantly, also geographically. The lowest average insolvency risk was observed in banks operating in Germany (Z-score with an average value of 236.54), and the highest in Romania (13.22), Greece (19.11), and Cyprus (19.48).[7] Banks operating in Poland had a higher-than-average level of insolvency risk during the period under review, measured using the Z-score index. Given the characteristics of the variables, dynamic models (Generalized Method of Moments version of GMM-SYS; Blundell, Bond 1998), commonly used in panel data-based studies for the banking sector, were used. The use of this type of model (using instrumental variables) allows for a departure from the standard assumption of strict exogeneity of the regressors. It permits the inclusion of lagged values of the dependent variable, which is not feasible for statistical panel models (with fixed effects and individual random effects) (Kozłowski 2016). GMM-SYS-based methods are therefore particularly useful for models that include endogenous or predetermined explanatory variables (Dańska-Borsiak 2009). In addition, a medium-sized research sample is a factor in the applicability of the GMM-SYS model (Bond 2002). The GMM-SYS estimator may provide more reliable and accurate results in similar cases (Baltagi 2005). Statistical conclusions in the area of the significance of the model parameters were based on one-step estimation. The Sargan test for the two-

[7] Estonia was omitted due to the very small number of observations.

step method (Hansen's test) was used for diagnostic purposes, as well as the Arellano-Bond AR (1) and AR (2) autocorrelation tests. The final shape of the estimated dynamic regression models is determined by Equation (2).

$$Z\text{-}sc_{it} = \alpha + \beta_1 Z\text{-}sc_{it-1} + \beta_2 ME_{it} + \beta_3 B_{it} + \beta_4 CR.PORTF_{it} + v_{it} \quad (2)$$

where:

$Z\text{-}sc_{it}$ – the value of the insolvency risk measure Z-score of bank i in period t,
ME_{it} – vector of control variables' values characterising the specificity of the macroeconomic and sectoral environment of bank i in a given country in period t,
B_{it} – vector of values characterising the selected bank business areas of the bank i in period t,
$CR.PORTF_{it}$ – vector of experimental variables representing the quality and structure of the bank's loan portfolio i in period t.

The estimation results based on the general model are presented in Table 2.

On the basis of the research, it can be verified that the banks' insolvency risk measured using the Z-score index is significantly dependent on the quality of the banks' loan portfolio in the area of receivables from the non-financial sector and the share of receivables from non-financial corporations in this portfolio. For both variables (NPL and CORL_TL), a negative statistically significant effect on the value of the Z-score index was confirmed (at a confidence level of 95%). Consequently, it should be pointed out that banks characterised by a lower quality of the loan portfolio (higher values of the NPL ratio) and a higher share of receivables from non-financial corporations in the loan portfolio are characterised on average by lower values of the Z-score index, which means that they have a higher risk of insolvency. No statistical basis was found to confirm the impact of the rate of change of total credit receivables from the non-financial sector on default risk.

Among the macroeconomic variables, the positive impact of the rate of change of GDP and the negative impact of the public debt level (in relative terms) and the inflation rate of the country on the Z-score of banks operating in that country were confirmed. Among the microeconomic characteristics of banks, the significance of the impact of the value and structure of deposits (negative correlation, significance of 5%) and the bank's involvement in the government securities market (negative correlation, significance of 10%) was confirmed. According to the results of the study, specialised banks are characterised on average by a lower level of insolvency risk as measured by the Z-score index (SPEC variable, positive correlation, significance of 1%). For bank size and diversification of income sources, there is no indication of their impact on bank insolvency risk in the EU between 2016 and 2022. The stability of the model was confirmed by making estimations with the exclusion of insignificant variables in the baseline model.

3.2. Quality of loan portfolios in banks subject to crisis management measures

In this section, the article aims to analyse whether the factors that influence bank insolvency risk are different for banks that were subject to insolvency or resolution proceedings.

For the purpose of preliminary analyses, banks under resolution or insolvency proceedings (29 entities for which data were available) were further divided into four groups depending on the applied crisis management measure. These groups included banks for which the following solutions were applied:

– resolution (R – six institutions);

– liquidation under standard insolvency proceeding with the payout of deposits by the deposit guarantee scheme (DGS) (U – 19 institutions);

– alternative insolvency proceeding, consisting of a loan portfolio transfer with the support of deposit guarantee funds (T – two institutions); and

– winding-up with the usage of government aid (SA – two entities; these are entities that were also subject to alternative proceedings involving the transfer of part of the portfolio using DGS, but due to an atypical taxpayer's financial contribution, these banks were separated into a distinct group).

The results of the analysis are summarized in Table 3.

Analyses of descriptive statistics indicate the very significant differences in both the level of insolvency risk and the characteristics of the quality and structure of the loan portfolio in banks subject to resolution or liquidation under standard insolvency proceedings (U) and in banks subject to other proceedings (SA, R, T). The average value of the Z-score index in the group of banks subject to resolution or insolvency proceedings (U, T, R, and SA) was 13.1, while in the control group (other banks) it was 149.5. Particularly low values were observed in the group of banks that received government aid as part of the insolvency proceeding (SA – 1.81). The group of banks subject to resolution and insolvency (U, SA, R, and T) was characterised by a significantly higher NPL ratio (16.3% vs. 6.5% in the other banks) and the NPL_B_SEC measure, which is the quotient of the value of the NPL ratio in a given bank in a given year and the average NPL level in the banking sector of the country where the bank was located. For this measure, in the case of banks subject to resolution and insolvency proceedings (U, SA, R, and T), the value averaged at the level of 246.7%, against 108.5% in other banks. Quite significant differences in the level of NPL and NPL_B_SEC are observed between banks subject to resolution and insolvency proceedings. The portfolios of banks subject to resolution (R) have a relatively better quality (NPL 12.73%).

As regards the portfolio structure, significant differences can be seen, among other things, in the share of corporate loans. While in the case of the control group, the level of this variable was 35.4%, in the case of banks undergoing resolution or insolvency proceedings (U, SA, R, and T), it was at an average level of 58.4%. It should be noted, however, that the higher share of this type of receivables was affected by the main banks against which a piecemeal liquidation under standard insolvency proceedings was applied, with the use of deposit payouts from the guarantee fund (61.2%). The share of this type of receivables was significantly lower for banks under resolution.

Taking into account the presented variation of selected variables for banks under resolution or insolvency proceedings in 2016–2022, the model parameters for the group of 29 credit institutions were estimated using the method described for the base model. The results are presented in Table 4.

For this group of banks, a negative statistically significant impact of the level of NPLs (5% significance) and the share of corporate loans in total loans (1% significance) on the level of the Z-score index was confirmed. In addition, a negative impact of the change in the value of the loan portfolio (NFSL_CH) was shown for these credit institutions, with a confidence level of 99%. It should be noted that the absolute values of the estimated coefficients for the NPL variable (0.141) and CORL_TL

(0.100) are significantly higher than for the base model (0.070 and 0.022, respectively), supporting the hypothesis that the quality of the loan portfolio and its structure have a greater impact on the risk of failure of banks in financial distress than for other entities. Estimation excluding insignificant variables in the baseline model confirmed the stability of the model.

4. Loan portfolio and borrower position in bank insolvency

The quality and structure of the loan portfolio may impact the risk of bank failure. Thus, the following research question is whether the loan portfolio is also a factor influencing what kind of crisis management measures are applied and how.

In the case of insolvency proceedings, there are two ways of managing the loan portfolio. First, the whole entity (including loan portfolio) might be liquidated within the standard insolvency proceeding, which assumes that once an entity is declared insolvent (or even earlier, depending on the supervisor's powers), it is no longer allowed to continue operating. In such a case, the assets (including the loan portfolio) of the failing bank create a bankruptcy estate and are gradually liquidated to cover the claims of creditors that were registered with the bankruptcy trustee, who manages the whole liquidation process. At the same time, the covered deposits are paid out by the deposit guarantee scheme up to the coverage limit. Some countries have developed alternative insolvency proceedings[8] dedicated to financial institutions, especially banks. As part of such a proceeding, the working (healthy) estate of the failing bank is transferred to the acquirer and continues operating. The power to sell the failed bank under this proceeding usually rests with the deposit guarantor,[9] and therefore, the main element of the bank's activity that is transferred is the deposit book (with selected assets). In this regard, such an alternative insolvency proceeding is very similar to resolution proceedings in its economic and financial effects. The difference is, however, the source of funding, which in the case of alternative insolvency proceedings is the deposit guarantee fund.

In the case of the resolution process, the treatment of the loan portfolio highly depends on its quality and profitability. When the loan portfolio is considered to be a healthy part of the bank (especially when the lending activity is considered to be a critical function or the particular lending activity is considered to be a core business line), it is transferred to the acquirer or bridge bank (together with at least part of the bank's deposits). The unprofitable or non-performing loan portfolio might be transferred to the bad bank or left in the bank in resolution. In the case of resolution (in contrast to insolvency proceedings), the measures are financed from the resolution fund (not from the deposit guarantee fund). A summary of the possible approaches to the management of the loan portfolio in a failing bank is presented in Table 5.

Having reviewed the possible ways of crisis management measures and the corresponding treatment of loan portfolios available in the EU and the Polish financial system, it is worth verifying what options were implemented most frequently and how the borrowers were treated in practice.

In the group of 34 banks that failed in the years 2016–2023, liquidation was initiated in 26 cases (in Poland, only two cases) and resolution in eight cases (in Poland, four cases). In 21 cases, the selected

[8] Usually administrative (not court-based).
[9] Other solutions might be allowed (e.g. where the supervisor performs such functions).

treatment was liquidation under the standard insolvency proceeding (together with the pay-out of guaranteed deposits; this proceeding was also implemented in Poland). Moreover, five cases included the transfer of part of the activity to the acquirer (supported by the deposit guarantee funds or budget funds; the direct use of taxpayers' money was applied in two cases), i.e. alternative insolvency proceeding (there was no such case in Poland, since such a solution is not available in Poland).

As regards resolution proceedings, the sale of businesses was implemented in five cases (two cases in Poland), and the bridge bank – three cases (two cases in Poland). The bad bank (asset separation) tool was applied only in one case (together with the bridge bank; this distinctive case was applied in Poland). In two cases (including one in Poland), the bail-in tool was applied (not only write down or conversion of own funds and eligible liabilities; the bailed-in positions included uncovered deposits).

Interestingly, Poland was the country where the resolution tools were implemented more frequently than insolvency proceedings. In the whole EU, the profile of the implementation of crisis management measures was different – insolvency proceedings were used more frequently than resolution.

The situation of borrowers varied depending on the source of the bank's problems and the applied tool. In all cases (where the data/news/communications allowed the situation to be verified), the borrowers had to continue paying back the loans normally (although sometimes the operational parameters, e.g. account number, were changed; the amount and loan repayment schedule were never changed). In the case of insolvency proceedings (both standard and alternative ones), the repayment of loans was continued to the bankruptcy estate or the acquirer that had taken over the loan portfolio of the bank as part of its insolvency proceeding. In the case of loan portfolio liquidation, some borrowers were encouraged to repay the loan earlier or refinance with another bank (as in the example of Sberbank Europe AG and ABLV Bank AS).[10]

In the case of resolution, usually the implementation of the resolution tool was not associated with any change for the borrowers. They were required to continue paying back the debt, usually to the same institution, since the implemented sale of business tool assumed a share deal (four cases: Sberbank d.d., Sberbank banka d.d., Kobenhavns Andelskassen, Banco Popular Espanol). This meant that the failing bank changed owner, but any reorganization and transfer of assets were not applied (at least not at the moment of resolution). In the case of two banks (Bank Spółdzielczy w Przemkowie and Idea Bank SA), loan portfolios were transferred to the acquirer and continued to be paid back there. An interesting case on an EU scale is the resolution of Getin Noble Bank, where the loan portfolio was split – part of the portfolio (mortgages denominated in Swiss francs) was left in the bank in resolution and the rest was transferred to the bridge bank (from the assets transferred to the bridge bank, at a later stage, receivables connected to leasing contracts were transferred to the bad bank). Consequently, the treatment of the borrowers was different depending on the risks associated with the given assets. The case of Getin Noble Bank is also connected with the borrowers' claims for a refund of paid instalments resulting from court judgments declaring irregularities in the banks' Swiss franc loan offer (which implies that borrowers become the banks' creditors). Due to the fact that such loans were left in the bank in a resolution that was declared bankrupt, such liabilities might be covered as part of the liquidation under standard insolvency proceeding. Considering the low value of the assets in the bankruptcy estate, it might be difficult to realize.

[10] Sberbank has closed a deal on the sale of a subsidiary in Austria, https://www.sberbank.at/, https://www.ablv.com/lv/services/banking/lending, accessed: 11 May 2024.

5. Conclusion

Default risk is one of the greatest threats to the ability of banks to maintain financial stability. The experience of the 2007–2009 financial crisis and the turbulence of the 2023 banking market indicate that the identification of banks at risk of insolvency and the subsequent effective implementation of crisis management measures are crucial in the context of maintaining the banking system's ability to perform its functions, including effective lending to the economy. The research results show significant variation in the average risk of bank insolvency across EU countries, as measured using the Z-score index for credit institutions. During the study period, i.e. 2016–2022, the highest insolvency risk was observed for banks operating in Romania, Greece, and Cyprus, and the lowest for the German banking sector. On average, banks operating in Poland were characterised by a higher insolvency risk than the EU average, which was reflected, among other things, in four resolution and two insolvency proceedings carried out during the research period, representing, respectively, 50% of all resolution proceedings implemented and more than 7% of insolvency proceedings in the EU.

The loan portfolio is one of the basic elements of traditional banking activity. Its quality has a direct impact on the insolvency risk of banks. Nevertheless, usually an analysis of banks' loan portfolios does not assume an analysis of their structures. In this regard, the conducted research broadens the available literature with important conclusions. Based on the results of the panel study, the quality of the loan portfolio as measured by the NPL ratio and the share of corporate loans in the portfolio of receivables from the non-financial sector were shown to be statistically significant negative determinants of banks' insolvency risk as measured by the Z-score index. It was also confirmed that the strength of the impact of these variables on insolvency risk is higher in the group of banks that eventually entered resolution or insolvency proceedings. Significant variation in the quality and structure of loan portfolios in groups of entities subject to different types of proceedings was confirmed through a case study. In particular, it was shown that banks under resolution had a higher loan portfolio quality than banks subject to insolvency proceedings.

Even more seldom is the analysis of the loan portfolio and the treatment of borrowers from the point of view of the selected crisis management measures. Therefore, the review and analyses (based on the case studies) in this regard allow the perspective in the loan portfolio assessments to be broadened. The study shows that loan portfolios are treated differently as an element of crisis management depending on their quality. Healthy loan portfolios are the drivers in crisis management, and then such tools are applied as transfer to the acquirer or bridge bank. In case of toxic loan portfolios, other tools are implemented – gradual liquidation by the bankruptcy trustee or transfer to the bad bank and gradual resolution. The study also shows that, regardless of the applied tool, usually the situation of the borrowers in crisis management does not change materially in this regard, as they are always required to repay the debt according to the initially agreed repayment schedule. The operational details may change, since further repayment might be continued to another party (the bankruptcy estate, acquirer, bridge bank, or bad bank). Interesting conclusions can be drawn from the comparative analysis between the EU and Poland in the field of treatment of loan portfolios in crisis management. In this context, it can be noticed that the resolution of Getin Noble Bank is the only example where the resolution authority decided to treat differently part of the borrowers who were associated with a high level of legal risk to the bank. In this case, effective crisis management required from the resolution authority the implementation of a broader mix of tools. Moreover, leaving the part of the borrowers

in the bank in resolution (being liquidated according to the standard insolvency proceedings) exposed the uninvestigated element of the insolvency and resolution proceedings, i.e. the treatment of bank borrowers (who are usually unprofessional retail clients). Those borrowers who have claims towards the bank regarding the improperly serviced debt have little chance of satisfying them, since they are not privileged in the claims hierarchy (as retail, unprofessional parties and not covered by the deposit guarantee scheme).

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Appendix

Table 1
Characteristics of the explanatory variables used in the model

Variable	Description	Data source
ZSC(-1)	The lagged variable explains	Own calculations based on data from BankFocus database
Macroeconomic and sectoral control variables (ME)		
GDP	Economic growth rate – change in GDP in the bank's country of operation at constant prices	Eurostat
HICP	Inflation level – HICP consumer inflation rate in the bank's country of operation	Eurostat
PU_DEBT	Public debt level – the ratio of public finance sector debt to GDP in the country of operation of the bank	World Bank
HHI	Level of concentration of the banking sector – HHI index	ECB
Microeconomic control variables (B)		
L_TA	Scale of the bank's operations as measured by the natural logarithm of assets	BankFocus
NII_TOIN	Diversification of the bank's sources of income – relationship of interest income to banking operation income	Own calculations based on data from BankFocus database
DEP_A	The role of deposits as sources of funding in a bank – deposits from the non-financial sector to total assets	BankFocus
CD_TD	Structure of the bank's deposit portfolio – ratio of current deposits to total deposits	BankFocus
TDS_A	Scale of reliance on investment in Treasury securities – Treasury debt securities to total assets	BankFocus
SPEC	Bank specialisation – binary variable: 1 – specialised bank (cooperative, investment or savings bank); 0 – universal bank	BankFocus
Variables relating to the quality and structure of the loan portfolio		
NPL	Share of impaired loans (past due more than 90 days) in total credit receivables from non-financial sector	BankFocus
NFSL_CH	Annual change in loans to the non-financial sector	Own calculations based on data from BankFocus database
CORL_TL	Share of loans to corporates in receivables from non-financial sector	Own calculations based on data from BankFocus database

Source: own elaboration.

Table 2
Results of estimation of the baseline model of the determinants of insolvency risk of banks operating in EU countries from 2016 to 2022

Variable	Coefficient	Standard error	P-value	Significance
ZSC(-1)	0.849	0.042	0.000	***
Const	16.454	4.881	0.001	***
GDP	0.172	0.026	0.000	***
HICP	-0.156	0.064	0.014	**
PU_DEBT	-0.043	0.011	0.000	***
HHI	-4.882	4.628	0.292	
L_TA	-0.236	0.163	0.147	
NII_TOIN	0.007	0.007	0.317	
DEP_A	-0.059	0.026	0.024	**
CD_TD	-0.025	0.011	0.028	**
TDS_A	-0.043	0.023	0.060	*
SPEC	6.105	1.830	0.001	***
NPL	-0.070	0.038	0.039	**
NFSL_CH	-0.012	0.009	0.171	
CORL_TL	-0.022	0.011	0.049	**
AR 1		-6.117 [0.000]		
AR 2		-0.235 [0.814]		

Notes:
*** significance at the level of 1%, ** significance at the level of 5%, * significance at the level of 10%.
AR 1 – 1st order autocorrelation test. AR 2 – 2nd order autocorrelation test.
Time effects are included but not reported. System GMM (1 lag used as instrument).

Source: own calculations.

Table 3
Level of insolvency risk and selected characteristics of the quality and structure of the loan portfolio of banks subject to resolution or insolvency proceedings between 2016 and 2022 and the control group

Group	ZSC	NPL	NPL_B_SEC	NFLS_TA	CORL_TL	MORTL_TL
Control	149.51	6.52	108.52	59.46	35.39	53.03
SA	1.81	29.02	178.39	60.97	n.d.	62.75
R	13.19	12.73	179.09	66.25	38.05	59.76
T	9.15	29.59	223.51	52.83	21.97	39.11
U	14.24	15.29	329.67	41.81	61.20	34.21
Total	147.94	6.61	112.35	59.34	35.66	53.02

Source: own calculations.

Table 4
Model estimation results for a group of banks under resolution or insolvency proceedings between 2016 and 2022

Variable	Coefficient	Standard error	P-value	Significance
ZSC(-1)	1.150	0.019	0.000	***
Const	30.886	9.730	0.002	***
GDP	0.015	0.074	0.840	
HICP	0.124	0.374	0.741	
PU_DEBT	-0.044	0.024	0.023	**
HHI	-12.848	12.258	0.295	
L_TA	-1.349	0.428	0.002	***
NII_TOIN	-0.124	0.013	0.000	***
DEP_A	-0.065	0.073	0.378	
CD_TD	0.015	0.029	0.611	
TDS_A	-0.072	0.081	0.373	
SPEC	13.948	5.222	0.008	***
NPL	-0.141	0.061	0.022	**
NFSL_CH	-0.097	0.020	0.000	***
CORL_TL	-0.100	0.020	0.000	***
AR 1		-1.053 [0.029]		
AR 2		0.514 [0.607]		

Notes:
*** significance at the level of 1%, ** significance at the level of 5%, * significance at the level of 10%.
AR 1 – 1st order autocorrelation test. AR 2 – 2nd order autocorrelation test.
Time effects are included but not reported. System GMM (1 lag used as instrument).

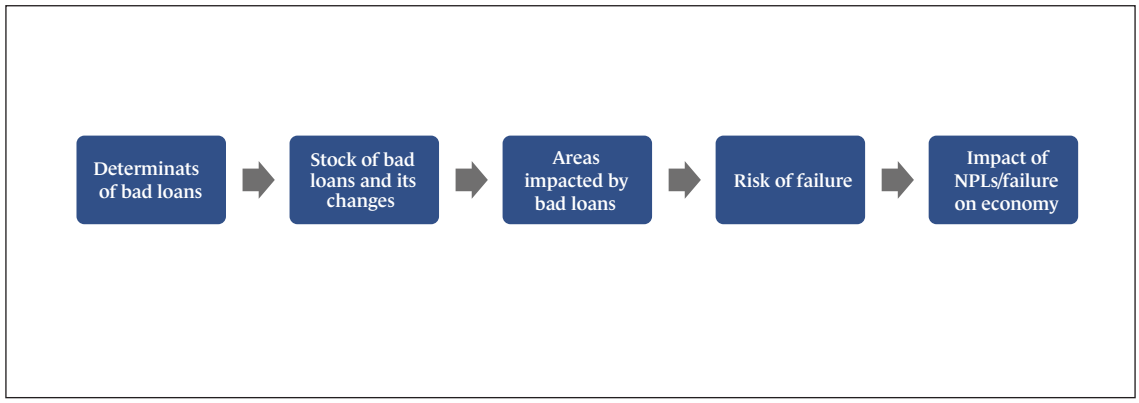
Source: own calculations.

Table 5
Treatment of loan portfolio in insolvency and resolution proceedings

Type of the procedure	Type of the actions	Legal framework	Managing party	Impact on borrowers	Any special treatment/ safeguard for borrowers
Insolvency proceedings	Liquidation of loan portfolio as part of standard insolvency proceeding Transfer of working loan portfolio to the acquirer by the DGS/ bankruptcy trustee (alternative insolvency proceeding)	Judicial procedure regulated by national regulations As part of judicial or separate administrative procedure	Bankruptcy trustee Bankruptcy trustee or special manager, usually with the deposit guarantee scheme is engaged	Should continue paying back the loan as agreed, but to the bankruptcy estate Should continue paying back the loan as agreed, but to the acquirer	No, but depends on the local framework
Resolution	Transfer of the working portfolio to the acquirer or bridge bank by the resolution authority Transfer of NPLs to the bad bank by the resolution authority Open bank bail-in	Administrative procedure regulated by the EU directives implemented in the Member State	Resolution authorities	Should continue paying back the loan as agreed, but to the acquirer of bridge bank Should continue paying back the loan as agreed, but to the bad bank Should continue paying back the loan as agreed	No, EU legal framework does not include any regulations regarding safeguards for bank borrowers
Resolution and liquidation	Liquidation of assets left in the bank in resolution and transfer of selected assets to other entity	Mix of the above (initially resolution is started, but assets left in the bank in resolution should be liquidated according to insolvency proceedings)	Resolution authority, administrator and bankruptcy trustee	Should continue paying back the loan as agreed to the bank in resolution and then to the bankruptcy estate	As above (depending on the type of procedure)

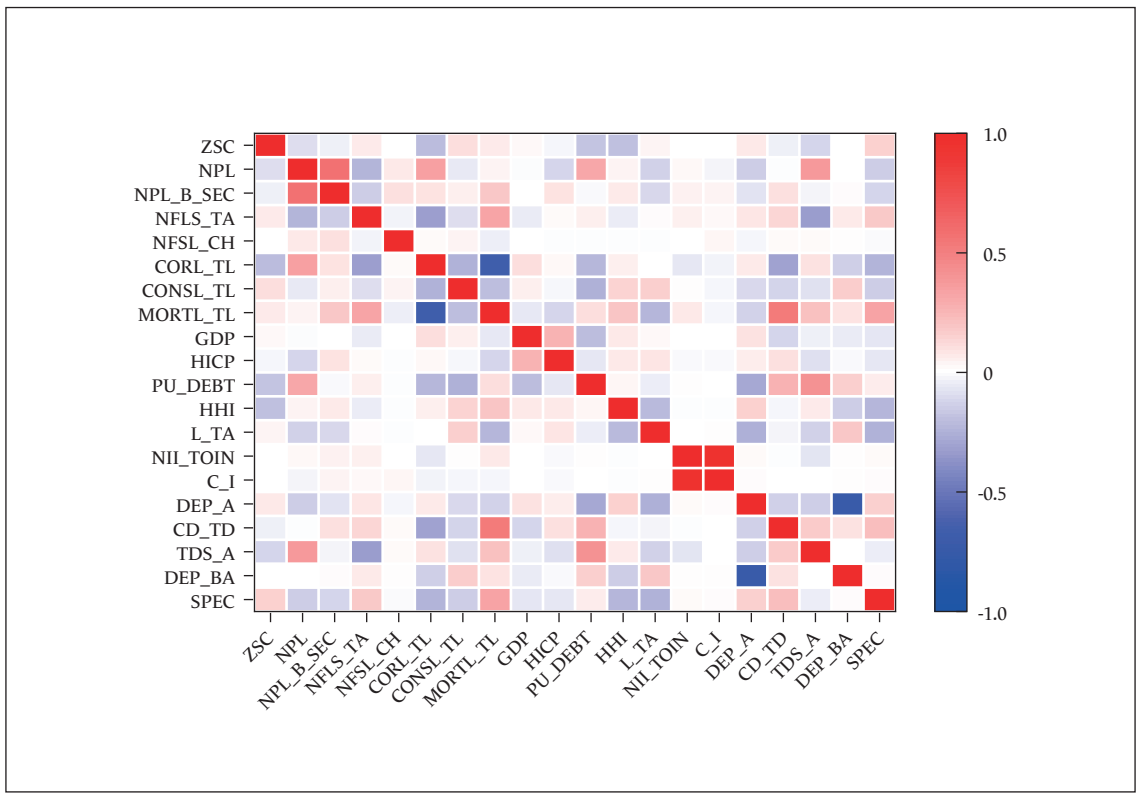
Source: own elaboration.

Figure 1
Interconnectedness between bad loans and banks' financial position and the economy



Source: own elaboration.

Figure 2
Correlation matrix of variables pre-selected for model construction



Source: own compilation using the Gretl programme.

Jakość i struktura portfela kredytowego: implikacje dla ryzyka niewypłacalności banku oraz narzędzi zarządzania kryzysowego

Streszczenie

Materializacja ryzyka kredytowego może stać się istotną przyczyną wzrostu ryzyka upadłości banków. O ile jednak związek między jakością kredytów hipotecznych a ryzykiem upadłości banków stał się ważnym obszarem badań po globalnym kryzysie finansowym, o tyle wpływ struktury kredytów na ryzyko upadłości banków, z uwzględnieniem roli kredytu gospodarczego i konsumenckiego w portfelu kredytowym, był badany rzadziej. Jeszcze rzadziej przeprowadzana jest analiza portfela kredytowego z perspektywy zarządzania kryzysowego.

Celem artykułu jest ocena, jaką rolę odgrywa portfel kredytowy w zarządzaniu ryzykiem niewypłacalności i kryzysem w bankach. Badanie umożliwia weryfikację zależności pomiędzy jakością i strukturą portfela kredytowego a ryzykiem wystąpienia niewypłacalności banku, a także ocenę traktowania portfela kredytowego i sytuacji kredytobiorców w ramach likwidacji oraz przymusowej restrukturyzacji. Analiza kształtowania się indeksu Z-score jako miary ryzyka upadłości banków w latach 2016–2022 wskazuje na jego znaczne zróżnicowanie, także geograficzne. Najniższe przeciętne ryzyko niewypłacalności zaobserwowano w bankach działających na terenie Niemiec, najwyższe w Rumunii, w Grecji i na Cyprze. Banki w Polsce miały w badanym okresie wyższy niż przeciętnie poziom ryzyka niewypłacalności, mierzonego za pomocą indeksu Z-score. Na podstawie wyników badania panelowego wykazano, że jakość portfela kredytowego oraz udział kredytów gospodarczych w portfelu są istotnymi statystycznie, ujemnymi determinantami ryzyka niewypłacalności banków mierzonego indeksem Z-score. Potwierdzono ponadto, że siła oddziaływania tych zmiennych na ryzyko niewypłacalności jest większa w grupie banków, które ostatecznie zostały objęte postępowaniem upadłościowym lub restrukturyzacją i uporządkowaną likwidacją.

Na podstawie studium przypadku potwierdzono istotne zróżnicowanie jakości i struktury portfeli kredytowych w grupach podmiotów objętych różnymi rodzajami postępowań (likwidacja lub przymusowa restrukturyzacja). W szczególności wykazano, że banki objęte przymusową restrukturyzacją charakteryzowała wyższa jakość portfela kredytowego niż w klasycznej likwidacji w ramach postępowania upadłościowego. Z badania wynika zatem, że portfele kredytowe są różnie traktowane jako element zarządzania kryzysowego zależnie od ich jakości. Z badania wynika również, że bez względu na zastosowane narzędzie sytuacja kredytobiorców w zarządzaniu kryzysowym zazwyczaj nie zmienia się istotnie w tym zakresie, zawsze są bowiem zobowiązani do spłaty zadłużenia zgodnie z ustalonym harmonogramem. Analiza porównawcza traktowania portfeli kredytowych w zarządzaniu kryzysowym w UE i w Polsce pozwoliła jednak na zidentyfikowanie dwóch istotnych wniosków. Po pierwsze, przymusowa restrukturyzacja Getin Noble Banku jest jedyną, w której zdecydowano się na odmienne potraktowanie części kredytobiorców stwarzających ryzyko prawne dla banku. Ujawniło to potencjalne brakujące elementy zarządzania kryzysowego. Po drugie, w Polsce procedura przymusowej restrukturyzacji była stosowana częściej niż likwidacja w ramach standardowego postępowania upadłościowego. Oznaczało to aktywniejsze podejście do utrzymania portfela kredytowego w porównaniu z innymi krajami UE.

Słowa kluczowe: portfel kredytowy, NPL, upadłość, restrukturyzacja i uporządkowana likwidacja