Resilience of the Banking Systems through Inflation and Pandemic

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Abstract
This study examines the resilience of the European banking system in the face of two major external shocks: the COVID-19 pandemic and the subsequent inflationary period. Building on the lessons learned from the 2007–2009 Global Financial Crisis, the research evaluates how regulatory reforms, particularly Basel III, and strengthened macroprudential frameworks shaped banks' ability to absorb shocks without triggering systemic instability. Using quarterly data from Q4 2014 to Q3 2024, the study employs descriptive statistics, covariance, correlation, and linear regression to analyze the impact of key macroeconomic variables—real GDP, inflation, unemployment, private sector credit growth, 3-month EURIBOR, and non-financial corporate debt—on non-performing loans (NPLs). Results indicate that NPLs steadily declined during the analyzed period, with only a minor and temporary increase at the onset of the pandemic, before reaching historical lows in 2022–2023. Regression findings reveal unemployment as the most significant determinant of NPLs, followed by inflation and corporate debt, while GDP, credit growth, and EURIBOR had no statistically significant direct effects. The findings demonstrate that banks were not only resilient during these crises but also contributed to economic recovery by maintaining credit flows and supporting government guarantee schemes. The study concludes that stronger capital buffers, liquidity reserves, and stress-testing frameworks enabled banks to function as stabilizers rather than amplifiers of systemic risk. Policy implications highlight the need to further strengthen regulatory frameworks, expand stress-testing, and reinforce cross-border supervisory cooperation to sustain resilience in the face of future shocks.

Keywords: *Banking resilience; Non-performing loans; COVID-19 pandemic; Inflation; Banking stability.*

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1. Introduction

The banking system is a cornerstone of the global economy, acting as the key intermediary between central banks, financial resources, and clients. Banks provide financing to companies and households, participate in capital markets, and serve as

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economic information providers. Their stability and profitability are essential for economic health. However, history has shown that banking systems can be both fragile and resilient when confronted with shocks. The motivation for this research stems from the contrast between the vulnerability of banks during the 2007–2009 financial crisis and their resilience in the face of the COVID-19 pandemic and the subsequent inflationary period. This study seeks to explore the role of regulatory reforms, particularly Basel III, in shaping this transformation.

The paper is divided into four chapters. The first chapter introduces the theme and its relevance, focusing on the role of banking systems and their sensitivity to crises. The second chapter provides a review of the literature, presenting theoretical and empirical insights from economic experts and highlighting the impact of regulatory frameworks introduced after 2009. The third chapter outlines the methodology and develops a case study on non-performing loans (NPLs), analyzed in relation to six macroeconomic variables as indicators of banking performance. The final chapter presents the conclusions, summarizing findings on the impact of the pandemic and inflation, and formulating recommendations for strengthening future resilience.

The central research question guiding the paper is:
"Why did banking systems avoid collapse during the COVID-19 pandemic and subsequent inflationary context, unlike during the 2007–2009 financial crisis, and to what extent did new international regulations contribute to this resilience?"

The main objectives of the paper are:
1. To explain how post-crisis reforms, particularly Basel III, enhanced the capacity of banks to withstand systemic shocks.
2. To demonstrate the resilience of banking systems during the COVID-19 pandemic and inflationary period, emphasizing their role as part of the solution rather than part of the problem.
3. To identify, through the case study of NPLs and macroeconomic variables, the mechanisms that allowed banks to manage risks in uncertain environments.
4. To extract lessons and propose recommendations for policymakers and banking institutions to further improve resilience in the face of future crises.

By integrating a comparative analysis of recent financial crises, a literature review, and empirical evidence, the paper contributes to a deeper understanding of the evolution of banking resilience. The findings highlight the critical role of regulation, risk management, and adaptive capacity in ensuring that banks act as stabilizers of the economy rather than amplifiers of systemic shocks.

2. Literature review

The resilience of banking systems has become one of the most discussed topics in contemporary economic research, particularly in light of successive global crises that have tested the stability and adaptability of financial institutions. Literature on the subject emphasizes that banks act not only as intermediaries between central banks, capital, and households, but also as fundamental players in capital markets and as providers of economic information. Their performance has a direct influence on economic growth, while their fragility can amplify recessions.

The purpose of this literature review is to examine the findings of key academic contributions regarding the resilience of banking systems during three crucial episodes: the **Global Financial Crisis of 2007–2009**, the **COVID-19 pandemic**, and the subsequent **inflationary period**. These crises are not only relevant individually, but also in comparison, as they highlight the evolution of banking regulation, particularly the implementation of the Basel III framework, and the improved ability of banks to absorb shocks.

To set the foundation, several fundamental concepts must be clarified. **Resilience** refers to the ability of banks to withstand shocks and adapt in ways that ensure continuity of their core functions. **Liquidity** represents the stock of funds held by a bank to meet its short-term obligations, typically maintained in cash or easily marketable assets. **Capital** in banking is the buffer provided by shareholders' investments, acting as a safeguard against losses. **Non-performing loans (NPLs)** are those with a high likelihood of default. **Monetary policy** refers to central bank or government decisions that influence the money supply and interest rates. Finally, **inflation** is the generalized increase in prices, which erodes the value of money and creates uncertainty.

2.1 The 2007–2009 Financial Crisis and Its Effects

The Global Financial Crisis (GFC) represents the starting point of contemporary debates on banking resilience. Barry Z. Cynamon, Steven M. Fazzari, and Mark Setterfield (2011) in *"Understanding the Great Recession"* highlight how, after a period of economic expansion in 2002–2006, the U.S. economy entered into recession at the end of 2007. The collapse of Lehman Brothers in September 2008 marked the climax of this downturn, leading to a dramatic fall in economic activity, bankruptcies, mass layoffs, and widespread uncertainty. The causes were multiple: a sharp decline in consumption, excessive and irresponsible lending, and a housing bubble fueled by subprime mortgages. When the real estate market collapsed, banks

suffered severe asset quality deterioration and liquidity shortages, triggering a credit crunch. The Federal Reserve responded with expansionary monetary policies, including interest rate cuts and liquidity injections, to stabilize the system (Cynamon et al., n.d.).

The crisis quickly spread to Europe, as analyzed by Jiří Mazurek (2016) in *"The Evaluation of Recession Magnitudes in EU Countries during the Great Recession 2008–2010"*. Following the collapse of major U.S. investment banks such as Merrill Lynch and Lehman Brothers, European economies experienced severe contractions. Between 2008 and 2009, the EU's GDP contracted by 5.5%, while unemployment surged from 6.8% to 10%. The EU's response came in the form of the *European Economic Recovery Plan* (2008), built on two pillars: stimulating demand and restoring confidence through fiscal injections amounting to 1.5% of EU GDP, complemented by longer-term competitiveness measures. The total fiscal stimulus reached 5% of EU GDP. National governments also adopted anti-crisis measures, including public sector reforms, pension adjustments, and banking sector bailouts (Mazurek, 2016).

Beyond immediate responses, the crisis triggered a rethinking of the entire regulatory landscape. Ashleigh Neill (2024), in *"Banking on Resilience: EU Macroprudential Policy and Systemic Risk"*, underscores how the European Central Bank and other regulators began focusing on systemic risk prevention. Using ΔCoVaR and Exposure-ΔCoVaR as measures of institutions' contributions to systemic risk between 1995 and 2017, Neill finds that macroprudential policies, such as limits on loan-to-value (LTV) and debt-to-income (DTI) ratios, as well as higher capital buffers, helped reduce procyclicality and credit expansion without adequate backing. However, the study also reveals asymmetries: tightening policies reduce systemic risk less effectively than loosening increases it, underscoring the complexity of calibrating interventions. Policies targeting borrowers, such as stricter exposure limits, proved particularly effective in lowering systemic vulnerability.

This strand of literature emphasizes three key lessons from the GFC: (1) banks' low capital and liquidity levels magnified shocks; (2) systemic risk was underestimated due to insufficient macroprudential oversight; and (3) bailouts, while necessary, undermined public trust. These findings informed the design of Basel III, which sought to impose stricter capital and liquidity requirements, anti-cyclical buffers, and stress testing mechanisms.

2.2 The COVID-19 Pandemic

The scars left by the 2007–2009 Global Financial Crisis (GFC) underscored the need for a new regulatory framework that could prevent similar collapses. The Basel III agreement represented the cornerstone of this post-crisis reform, strengthening banks' capital adequacy, liquidity, and resilience against shocks. The COVID-19 pandemic, emerging in early 2020, became the first real-world stress test for these reforms, offering an unprecedented opportunity to evaluate their effectiveness.

Julia Giese and Andy Haldane (2020), in their study *"COVID-19 and the Financial System: A Tale of Two Crises"*, demonstrate the stark contrast between the GFC and the pandemic. Whereas banks had been at the heart of the financial turmoil in 2008, during COVID-19 they became part of the solution. This time, banks expanded credit to businesses and households, often supported by government guarantees, thus helping to maintain the flow of finance in the real economy. Such behavior reflected their improved capital positions, stronger liquidity buffers, and the countercyclical tools embedded in Basel III.

The earlier crises had exposed the fragility of banks with low liquidity and weak capital cushions. By 2020, however, stress testing, countercyclical buffers, and more robust leverage ratios allowed banks to remain operational despite unprecedented economic disruptions. The Bank of England, for instance, implemented more flexible repo operations, while central banks worldwide provided abundant liquidity support.

Yifei Cao and Jen-Yu Chou (2022), in *"Bank Resilience over the COVID-19 Crisis: The Role of Regulatory Capital"*, confirm that banks with higher capital ratios performed better during the pandemic. Their analysis shows that Basel III requirements substantially improved robustness, enabling institutions to continue lending and avoid the kind of systemic collapse witnessed in 2008-2009.

Similarly, the Basel Committee on Banking Supervision (2021), in *"Early Lessons from the Covid-19 Pandemic on the Basel Reforms"*, emphasizes how reforms introduced after the GFC proved vital. At the onset of the pandemic, equity markets plummeted — the S&P 500 fell by 30% — while liquidity demand surged. Authorities responded with large-scale interventions: lowering interest rates, asset purchase programs, liquidity facilities, and state-guaranteed loans. Basel III buffers, including countercyclical capital requirements, allowed banks to absorb shocks without withdrawing credit provision. Although profitability was hit by rising funding costs and falling asset valuations, systemic stability was preserved.

An important aspect during COVID-19 was systemic risk. Nicola Borri and Giorgio Di Giorgio (2021), in *"Systemic Risk and the COVID Challenge in the European Banking Sector"*, argue that while stock prices of banks dropped sharply, systemic risk was better contained than in 2008. Large banks continued to contribute disproportionately to systemic risk, but overall the sector was more resilient. The authors attribute this to stronger capital buffers, frequent stress testing, and coordinated action by the European Central Bank (ECB), national governments, and the European Union.

The central bank response was indeed decisive. Ramos-Francia and García-Verdú (2021), in *"Central Bank Responses to COVID-19"*, analyze measures across Latin America, the U.S., and the EU. They note that crises are typically characterized by liquidity shortages, risk-premium hikes, and widespread uncertainty, often leading investors to exit markets. To prevent this, central banks injected massive liquidity, deployed repo instruments, purchased government and corporate bonds, and intervened in foreign exchange markets to stabilize currencies. Conditionality was imposed: banks receiving support could not repurchase shares or distribute dividends, while firms were often prohibited from mass layoffs. These policies ensured that credit continued flowing to households and businesses.

Fiscal measures also played a crucial role. Catherine Casanova, Bryan Hardy, and Mert Onen (2021), in *"Covid-19 Policy Measures to Support Bank Lending"*, show how regulatory relaxations, such as the temporary reduction of countercyclical capital buffers, allowed banks to lend more flexibly. Dividend restrictions and public guarantees for loans further strengthened balance sheets. Government-backed credit programs, particularly for SMEs, prevented a surge in defaults. By reducing penalties for using capital buffers, policymakers created additional lending space, while direct fiscal support (tax relief, transfers, capital injections) encouraged continued lending despite economic disruptions.

Performance metrics highlight this resilience. Asli Demirguc-Kunt, Alvaro Pedraza, and Claudia Ruiz-Ortega (2020), in *"Banking Sector Performance During the COVID-19 Crisis"*, find that liquidity assistance reduced market risk perceptions and supported credit flows. Nevertheless, banks underperformed relative to non-financial firms, with stock prices failing to recover as quickly. Institutions with larger liquidity buffers outperformed weaker ones, and small banks even showed relative advantages compared to global giants. The findings suggest that while resilience was improved, investors still expected banks to shoulder significant losses from corporate defaults.

Non-performing loans remained a concern. Veton Zeqiraj, Constantin Gurdgiev, Kazi Sohag, and Shawkat Hammoudeh (2024), in *"Economic Uncertainty, Public Debt and Non-Performing Loans in the Eurozone: Three Systemic Crises"*, explore the relationship between uncertainty, public debt, and NPLs during 2007–2022. Interestingly, while economic uncertainty (measured through the EPU index) typically correlates positively with NPLs, during COVID-19 the effect was muted or even reversed due to proactive ECB and government measures. This contrasts with the 2007–2012 period, when inadequate preparation led to soaring NPLs. Their panel dataset of 3,900 observations across 194 banks in 19 Eurozone countries demonstrates that policies adopted after the GFC — higher liquidity, capital buffers, and proactive monetary measures — prevented an escalation of NPLs during the pandemic.

Overall, the literature converges on a key point: the pandemic marked a **paradigm shift**. Whereas the GFC revealed fragility, COVID-19 highlighted resilience. This was achieved through the combined effect of Basel III reforms, central bank liquidity provision, fiscal support, and stricter macroprudential oversight. Banks did not collapse; rather, they served as transmission mechanisms for state support to the real economy, facilitating recovery.

2.3 Inflation

Following the mitigation of the COVID-19 crisis, massive fiscal and monetary injections created a new challenge for the global economy: a surge in inflation. This was further aggravated by geopolitical shocks, including the war in Ukraine and instability in the Middle East, which raised energy and commodity prices. The banking sector had to navigate these inflationary pressures while maintaining profitability and resilience.

Elie Farah, Matthew Austen, and Emiliano Carchen (2022), in *"The Impact of Inflation on European Banking and What to Do About It"*, note that inflation negatively affects banking performance through multiple channels. Reduced demand for credit, driven by recessionary pressures in several sectors, lowers interest income. At the same time, higher default rates increase credit risk, while volatile capital markets reduce fee-based income from asset management services. Additionally, rising bond yields increase funding costs for both banks and governments, and higher operating expenses erode net profits. The authors argue that banks must strengthen strategic planning, improve asset-liability management, and monitor credit quality more rigorously to manage inflation-induced risks. Enhanced communication with central banks is also vital to coordinate responses, especially in avoiding a recurrence of sovereign debt crises similar to 2012.

Despite these risks, inflation has in some cases been beneficial to banks. Nathan Converse and Anil K. Jain (2024), in *"Do Banks Gain from Inflation? Evidence from Inflation Surprises"*, analyze U.S. bank stock performance during 2021–2022. They find that bank equities outperformed the market during inflationary shocks. The main driver was the widening gap between lending rates and deposit rates: while loan rates increased, deposit rates were adjusted upward more slowly, boosting net interest margins. Moreover, the Federal Reserve's credible commitment to fighting inflation reassured investors. Banks with large retail deposit bases and fewer market-traded assets benefited the most, as they could capture higher margins with relatively stable funding costs.

A similar dual effect is observed in Europe. Renata Karkowska, Zbigniew Korzeb, and Paweł Niedziółka (2025), in *"Inflation's Dual Impact on European Banks' Profitability"*, show that inflation initially has a positive effect on net interest margins and interest-bearing assets. Borrowers often increase credit demand to offset declining purchasing power, expanding banks' loan portfolios. Additionally, uncertainty in capital markets raises demand for financial services such as advisory and hedging, generating non-interest income. However, these benefits are offset by negative effects: asset deterioration, rising operating expenses, and increased credit risk. As inflation persists, return on assets (ROA) and return on equity (ROE) decline, especially in smaller banks less capable of absorbing higher costs. The study highlights the importance of bank size, liquidity reserves, and capital adequacy in determining resilience to inflationary pressures.

Katharina Bergant, Mai Hakamada, Divya Kirti, and Rui C. Mano (2025), in *"Inflation and Bank Profits: Monetary Policy Trade-Offs"*, published by the IMF, provide additional nuance. They argue that while inflation raises both revenues (via interest income) and costs (via asset deterioration and higher funding expenses), overall bank profitability remains broadly stable due to hedging strategies and balanced exposure. Importantly, restrictive monetary policy did not significantly undermine banks' lending capacity or profitability. However, less traditional banks — particularly those in emerging markets — faced heightened risks due to weaker hedging capacities and greater sensitivity to macroeconomic volatility.

Taken together, the literature portrays inflation as a **double-edged sword** for banks. On the one hand, it can increase net interest margins and short-term profitability. On the other, it erodes asset quality, raises credit risk, and pressures smaller banks disproportionately. Success in navigating inflation depends heavily on robust liquidity, strong capital positions, effective macroprudential policies, and central bank coordination.

This chapter should include an overview of the scientific literature in the field of the topic researched. The literature review should be synthesized, including the most important references to the topic.

The research gap should be highlighted in the context of the scientific literature, emphasizing the value added by the article (how is the article different from other similar ones, what novelty it brings to the field).

3. Research methodology

Research Questions/Aims of the research

The present study seeks to explore the resilience of banking systems in the face of external shocks, with a particular focus on the COVID-19 pandemic and the subsequent inflationary period. While the 2007–2009 Global Financial Crisis revealed the fragility of banks and their role as amplifiers of systemic instability, recent crises have highlighted their improved capacity to withstand disruptions. Against this backdrop, the research addresses the following central questions:

- How did banking systems respond to the shocks of the COVID-19 pandemic and the subsequent inflationary environment?
- To what extent do macroeconomic variables (real GDP, inflation, unemployment, private sector credit growth, 3-month EURIBOR, non-financial corporate debt) influence non-performing loans (NPLs)?
- Why did banks show greater resilience during these crises compared to the 2007–2009 financial crisis?
- What role did regulatory reforms (e.g., Basel III) and macroprudential policies play in strengthening banking resilience?

Aims of the Research

- To **evaluate** the relationship between macroeconomic factors and NPLs using quantitative methods.
- To **assess** the resilience of banking systems during the pandemic and inflationary aftermath.
- To **compare** banking performance in recent crises with vulnerabilities observed in 2007-2009.
- To **provide** recommendations for policymakers and financial institutions to enhance future resilience.

Research Methods

The purpose of this study is to analyze the impact of the COVID-19 pandemic, as well as the immediately following inflationary period, on banking systems. The

research adopts a **quantitative approach**, employing descriptive statistics, correlation, covariance, and linear regression to assess the impact of macroeconomic variables on non-performing loans (NPLs).

The **dependent variable** is the share of non-performing loans in total loans, while the **independent variables** are: real GDP, inflation rate, unemployment rate, growth rate of private sector credit, 3-month EURIBOR, and the indebtedness ratio of the non-financial corporate sector.

Non-performing loans play a critical role in the stability and health of banking systems. They serve as an indicator of asset quality, reflecting whether there are difficulties in loan repayment. High levels of NPLs negatively affect bank profitability, reduce solvency, limit the capacity to issue new loans, and erode capital bases. At a systemic level, they can amplify risks, potentially threatening the entire banking sector. Furthermore, NPLs influence macroprudential policy and regulatory design. Their significance is therefore not negligible in assessing banking resilience, as they highlight weaknesses or strengths in financial performance and institutional stability.

The analysis covers the **quarterly variation of NPLs** between Q4 2014 and Q3 2024, comprising 40 observations. In order to construct a more comprehensive picture of the impact of external crises—where banks were not the primary source of instability but rather part of the solution, demonstrating greater resilience than in the previous crisis—data were collected from the **European Central Bank database**, focusing on the European Union. The dataset was processed using Excel and ANOVA.

The econometric analysis employs the following variables:

- **Non-performing loans (% of total loans):** Measures the proportion of loans (typically overdue for more than 90 days) issued by financial institutions that are unlikely to be repaid. Expressed as a percentage, it reflects the overall quality of the banking sector's loan portfolio.
- **Real Gross Domestic Product (GDP):** Represents the total value of final goods and services produced by an economy, adjusted for inflation. It indicates general economic activity and the business cycle, with growth signaling expansion and decline indicating recession.
- **Inflation rate:** Reflects the quarterly growth of consumer prices in the economy. High inflation weakens the repayment capacity of households and firms, thereby indirectly raising NPL levels.

- **Unemployment rate:** Indicates the share of the labor force willing and able to work but without employment. Higher unemployment is usually associated with greater credit default risk, particularly for personal loans.
- **Private sector credit growth rate:** Measures the annual growth of loans issued to households and private firms. Rapid growth can signal excessive credit expansion and greater risk-taking by financial institutions.
- **3-month EURIBOR:** Indicates the average interest rate at which major European banks lend euros to each other over three months. It serves as a benchmark for interbank funding costs and indirectly influences lending rates for customers. A higher EURIBOR increases borrowing costs, which in turn affects debt repayment capacity.
- **Non-financial corporate debt ratio:** Represents the share of total non-financial corporate debt relative to GDP. Elevated levels signal heightened exposure to financial risk and increase the likelihood of defaults under adverse economic conditions.

The variables were synthesized in a chronological table to track their evolution. Descriptive statistics provide an overview of their main characteristics, including NPL ratios, real GDP, inflation, unemployment, private credit growth, 3-month EURIBOR, and corporate indebtedness.

Covariance was calculated to identify the direction in which NPLs and the macroeconomic variables evolve together. Positive covariance indicates that variables move in the same direction, while negative covariance indicates inverse movements. This provides an initial indication of common trends.

Correlation was applied to evaluate the strength and direction of the linear relationship between NPLs and the independent variables. The correlation coefficient ranges between -1 and +1. A positive correlation indicates simultaneous increases or decreases, while a negative correlation indicates an inverse relationship.

Finally, **linear regression analysis** was conducted to investigate the causal relationship between the dependent variable (NPL ratio) and the independent variables (real GDP, inflation, unemployment, private credit growth, 3-month EURIBOR, and non-financial corporate debt). Regression results allow for the interpretation of both the direction and the magnitude of causal effects, providing a more detailed understanding of the influence of macroeconomic factors on banking stability.

The estimated regression equation is specified as:
$NPL_t=\beta0+\beta1\cdot GDP_t+\beta2\cdot INF_t+\beta3\cdot UNEMP_t+\beta4\cdot CRED_t+\beta5\cdot EURIBOR_t+\beta6\cdot CORPDEBT_t+\varepsilon t$ (1)
where:

- NPL_t = non-performing loans as % of total loans at time t
- GDP_t = real Gross Domestic Product
- INF_t = inflation rate (HICP)
- $UNEMP_t$ = unemployment rate
- $CRED_t$ = private sector credit growth rate
- $EURIBOR_t$ = 3-month EURIBOR
- $CORPDEBT_t$ = non-financial corporate debt as % of GDP
- $\beta0$ = constant (intercept)
- $\beta1 \ldots \beta6$ = regression coefficients
- εt = error term

4. Results and discussion

Table 1 (see Appendix) provides a chronological overview of all variables across a period of approximately 10 years, on a quarterly basis. We begin with the share of non-performing loans (NPLs) as a percentage of total loans. At the end of 2014 and throughout 2015, NPLs reached relatively high levels. Thereafter, a consistent downward trend was observed until the end of the analyzed period: from a maximum of 6.84% in Q4 2015 to a minimum of 1.83% in Q1 2023. This decline reflects the gradual implementation of macroprudential policies and Basel III requirements.

By Q4 2019, immediately before the COVID-19 outbreak, the NPL ratio had already declined to 2.78%. During Q1 2020, coinciding with the onset of the pandemic, NPLs rose slightly to 2.97%, but by Q2 2020 the value had already decreased to 2.76%. Thereafter, NPLs continued to decline, demonstrating the effectiveness of prudential measures in preventing a sharp rise in loan defaults and underlining the resilience of the banking sector during the pandemic. The downward trajectory continued until Q2 2023, when inflationary pressures—exacerbated by the energy crisis and the Russia–Ukraine war—caused a slight uptick. Nevertheless, NPL levels remained below both pre-pandemic and pandemic values.

Real GDP showed steady growth between 2014 and 2019 but declined sharply in 2020. The lowest point occurred in Q2 2020 (lockdown period), when GDP fell

from €3,097,190.2 million in Q4 2019 to €2,660,459.8 million. GDP recovered in Q3 2020, in line with the relaxation of health restrictions.

Inflation, measured by the Harmonized Index of Consumer Prices (HICP), was moderate before the pandemic and fell further in 2020 as consumption declined. From Q4 2021 through 2022 and into 2023, however, inflation surged. Its impact on NPLs was delayed, with defaults starting to increase only from Q4 2023 onward.

Unemployment rose during the pandemic and lockdown period but followed a long-term downward trend from 2014 to 2024. Government restrictions on layoffs in firms receiving state aid limited unemployment spikes and indirectly helped contain NPLs.

Private sector credit growth was subdued and even negative during the pandemic due to suspended or frozen private activities. Consequently, the reduced issuance of new loans prevented a significant increase in NPLs.

The 3-month EURIBOR was negative during the pandemic as part of expansionary policies but increased afterwards to counter inflationary pressures. Rising interest rates coincided with a slight increase in NPLs.

Non-financial corporate debt rose in 2020–2021 but did not translate into a proportional rise in NPLs, as state-backed schemes effectively cushioned risks.

Descriptive Statistics

Table in Annex no. 2 summarizes descriptive statistics. Results indicate:

- **NPLs:** Positive skewness (outliers pulling the mean upward), moderate dispersion, negative kurtosis (fewer extremes), and absence of a dominant mode.
- **Real GDP:** Relatively symmetric distribution, high standard deviation, negative skewness and kurtosis (fewer extremes, values clustered around the mean).
- **Inflation:** Positive skewness and kurtosis, high dispersion, suggesting volatility and presence of extreme values.
- **Unemployment:** Positive skewness, moderate dispersion, negative kurtosis, indicating generally moderate values with occasional crisis-driven spikes.
- **Private sector credit growth:** Negative skewness, negative mean and median, high dispersion, indicating contractions during several periods.
- **3-month EURIBOR:** Positive skewness, high dispersion, volatility reflected in both negative and positive values.
- **Non-financial corporate debt ratio:** Symmetric distribution, moderate dispersion, kurtosis near zero, stable over time.

Empirical Findings

According to the regression results (Table 5), the estimated coefficients are:

NPLt=β0+0.000 GDPt+0.0623 INFt+1.829 UNEMPt+0.002 CREDt−0.015 EU RIBORt−0.107 CORPDEBTt (2)

Key interpretations:

- A **1% increase in unemployment** leads to an increase of **1.829 percentage points in NPLs** ($p < 0.01$).
- A **1 percentage point increase in inflation** increases NPLs by **0.0623 points** ($p < 0.1$).
- A **1 percentage point increase in corporate debt-to-GDP** reduces NPLs by **0.107 points** ($p < 0.01$), contrary to the bivariate analyses.
- Real GDP, private sector credit growth, and EURIBOR did not show significant effects in the regression model.

Covariance Analysis

The covariance analysis (Table 3) provides insight into the co-movements between the dependent variable, the ratio of non-performing loans (NPLs), and the selected macroeconomic indicators. A negative covariance was identified between NPLs and real GDP, suggesting that improvements in economic activity are associated with declining levels of loan defaults. This trend was visible in the pre-pandemic period (2014–2019), when steady GDP growth coincided with falling NPLs, but also during the post-pandemic recovery, when rising GDP was accompanied by lower default rates. A similar negative covariance was observed between NPLs and inflation, reflecting that periods of higher inflation—particularly after 2021—were paradoxically associated with lower levels of NPLs, as households and firms sought to borrow more actively and benefitted from government support schemes. By contrast, unemployment displayed a positive covariance with NPLs, confirming that deteriorations in labor market conditions directly translated into increased repayment difficulties, particularly at the onset of the COVID-19 crisis. The covariance between NPLs and private sector credit growth was negative, indicating that when credit expansion slowed, the proportion of NPLs tended to rise. In the case of the 3-month EURIBOR, covariance was also negative, suggesting that higher interbank rates were linked to lower levels of NPLs, whereas expansionary periods with low interest rates coincided with greater credit risk. Finally, the relationship between NPLs and non-financial corporate debt was positive, highlighting that periods of rising indebtedness in the corporate sector increased the likelihood of defaults.

Correlation Analysis

Correlation results (Table 4) confirm many of the insights from the covariance analysis but provide a clearer picture of the strength and direction of relationships. A significant negative correlation was identified between NPLs and real GDP, underscoring the countercyclical nature of defaults: economic contractions, such as in 2020, coincided with higher NPLs, while the recovery period corresponded with lower defaults. Inflation was also negatively correlated with NPLs, an effect that became evident after the pandemic, when soaring inflation rates (2021–2023) coincided with historically low NPL ratios, partly due to the stronger position of banks and the effectiveness of government interventions. The relationship between unemployment and NPLs was strongly positive, confirming the sensitivity of loan repayment capacity to labor market dynamics. Credit growth in the private sector showed a negative correlation with NPLs, meaning that when demand for credit contracted, as during the pandemic, defaults increased. Similarly, the correlation between NPLs and EURIBOR was negative: higher interbank rates in the inflationary period corresponded with lower defaults, while near-zero or negative rates during the pandemic did not prevent mild increases in NPLs. Finally, the correlation between NPLs and non-financial corporate debt was positive, with pandemic-related corporate borrowing contributing to a temporary rise in defaults. Overall, the correlation analysis reinforces the notion that NPLs are highly sensitive to cyclical macroeconomic fluctuations.

Regression Analysis

The regression analysis (Table 5) provides a multivariate perspective on the determinants of NPLs, allowing for the simultaneous influence of macroeconomic variables to be assessed. The model demonstrated a very high explanatory power, with an R^2 value of 98.01% and a multiple correlation coefficient close to 1, indicating that variations in NPLs are largely explained by the chosen independent variables. The F-statistic was large and statistically significant, confirming the robustness of the model. Among the independent variables, unemployment emerged as the most powerful predictor: a one-unit increase in the unemployment rate was associated with a rise of 1.829 units in NPLs, with a highly significant p-value close to zero. Inflation also proved significant, with a positive coefficient of 0.0623, suggesting that higher consumer price growth increases default risks, albeit to a smaller magnitude than unemployment. Interestingly, the debt ratio of non-financial corporations was significant but negatively related to NPLs: a one-unit increase in corporate debt relative to GDP reduced NPLs by 0.107 units. This counterintuitive finding contrasts with the positive relationships observed in covariance and correlation analyses but can be explained by the multivariate nature of regression, where other variables simultaneously affect the outcome. By contrast,

real GDP, private credit growth, and EURIBOR did not exhibit statistically significant direct effects on NPLs in the regression framework. Taken together, these results indicate that unemployment, corporate debt, and inflation are the most influential macroeconomic drivers of NPLs in the European Union during the analyzed period, while other indicators play an indirect or secondary role.

Limitations

The study covers a 10-year period with quarterly data. A monthly dataset would improve precision, while extending the timeframe to include the 2007–2009 financial crisis and the European sovereign debt crisis would allow for deeper comparisons. Future research could also include profitability indicators (ROA, ROE), alternative macroeconomic variables (e.g., nominal GDP, 6-month EURIBOR), or disaggregated regional/national analyses within the EU to enrich understanding of banking resilience.

5. Conclusions

Looking back, the COVID-19 pandemic reshaped not only human life and values but also the functioning of economic and financial systems. Like societies, banking systems undergo transformation after major crises. The global financial crisis of 2007–2009, originating in the United States and spreading across Europe, had exposed the weaknesses of banks, including lax credit standards, inadequate supervision, fragile balance sheets, and insufficient regulation. Its symbolic moment—the collapse of Lehman Brothers—illustrated how banks had become part of the problem. Recovery required massive state interventions, central bank liquidity injections, and government aid programs. Confidence in banks reached historic lows, and the crisis highlighted the systemic costs of bank failures.

Learning from this painful experience, regulators and financial institutions sought to prevent another collapse of similar magnitude. Basel III was introduced as the cornerstone of reforms, imposing higher levels of capital and liquidity, alongside the creation of buffers above minimum requirements. Stress testing, such as those implemented by the Bank of England, added an additional safeguard. Thus, when the COVID-19 pandemic erupted in early 2020, banks entered the crisis with stronger foundations.

The pandemic served as the first true test of the post-crisis regulatory framework. While the health crisis paralyzed global economies, banks demonstrated resilience by continuing to extend credit, supported by their higher liquidity and capital buffers. Regulators allowed the use of surplus reserves, enabling banks to absorb

shocks without severe deterioration in balance sheets. Authorities also relied on banks as intermediaries for government-backed credit guarantee schemes, ensuring companies could maintain operations and employment. Central banks supplied liquidity through repo operations, while commercial banks managed to remain profitable, largely through traditional operations.

After the pandemic, however, excess liquidity fueled high inflation, eroding purchasing power. Yet banks adapted once again. Investment banks benefited from rising capital markets and asset valuations, while commercial banks profited from the widening spread between loan and deposit rates. As central banks raised interest rates to curb inflation, commercial banks also increased lending rates, further strengthening profitability. Evidence thus shows that the measures adopted before the pandemic proved effective: banks were resilient both during the health crisis and in the inflationary aftermath.

A central indicator of this resilience is the rate of non-performing loans (NPLs). Compared to the 2007–2009 crisis, NPL levels remained lower during the pandemic and subsequent inflationary period. More rigorous client screening, strengthened by European Central Bank recommendations, contributed significantly. Government-backed credit schemes further reduced risk exposure, as firms receiving support were required to retain employees, indirectly lowering credit risk for banks.

Resilience, however, is not merely about avoiding crises but about absorbing shocks without major deterioration in profitability or solvency. The findings of this study confirm that the new regulatory environment—higher capital, liquidity buffers, macroprudential oversight, and stress testing—was effective in safeguarding banking stability.

This research can serve as a resource both for non-specialists seeking to understand banking resilience and for experts, regulators, and policymakers. Governments and central banks may use these findings to design stronger regulations, improve supervisory frameworks, and reinforce systemic stability.

Future improvements should focus on raising minimum capital and liquidity thresholds, expanding buffers, strengthening creditworthiness assessments, and continuously optimizing banking laws. Constant monitoring of credit, market, and operational risks, as well as expanding the scope and frequency of stress tests, will be vital. Additionally, cross-border crisis simulations can help ensure that banks are prepared to withstand global systemic shocks. Ultimately, banking resilience

depends not only on regulatory measures but also on improved financial management, responsible customer behavior, and adaptive policymaking.

References

Cynamon, B. Z., Fazzari, S. M., & Setterfield, M. (2012). *Understanding the Great Recession. In After the Great Recession: The Struggle for Economic Recovery and Growth*, (pp. 3-30). Cambridge University Press. https://doi.org/10.1017/CBO9781139059589.004

Mazurek, J. (2016). The Evaluation of Recession Magnitudes in EU Countries during the Great Recession 2008-2010. *Review of Economic Perspectives*, 16(3), 231-244. https://doi.org/10.1515/revecp-2016-0014

Neill, A. (2024). Banking on resilience: EU macroprudential policy and systemic risk. *International Review of Economics & Finance*, 93(Part A), 678-699. https://doi.org/10.1016/j.iref.2024.03.058

Giese, J., & Haldane, A. (2020). COVID-19 and the financial system: A tale of two crises. *Oxford Review of Economic Policy*, 36(Supplement_1), 200-214. https://doi.org/10.1093/oxrep/graa024

Cao, Y., & Chou, J.-Y. (2022). Bank resilience over the COVID-19 crisis: The role of regulatory capital. *Finance Research Letters*, 48, 102976. https://doi.org/10.1016/j.frl.2022.102976

Basel Committee on Banking Supervision. (2021, iulie). *Early lessons from the Covid-19 pandemic on the Basel reforms*. Bank for International Settlements. https://www.bis.org/bcbs/publ/d521.htm

Borri, N., & Di Giorgio, G. (2022). Systemic risk and the COVID challenge in the European banking sector. *Journal of Banking & Finance*, 140, 106073. https://doi.org/10.1016/j.jbankfin.2021.106073

Ramos-Francia, M., & García-Verdú, S. (2022). Central Bank Response to COVID-19. *Latin American Journal of Central Banking* (previously Monetaria), 3(3). https://doi.org/10.1016/j.latcb.2022.100065

Casanova, C., Hardy, B., & Onen, M. (2021, September). Covid-19 policy measures to support bank lending. *BIS Quarterly Review*, Bank for International Settlements. https://www.bis.org/publ/qtrpdf/r_qt2109e.htm

Demirguc-Kunt, A., Pedraza Morales, A. E., & Ruiz Ortega, C. (2020). *Banking Sector Performance During the COVID-19 Crisis* (Policy Research Working Paper Series No. 9363). The World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/367371597793467474/banking-sector-performance-during-the-covid-19-crisis

Zeqiraj, V., Gurdgiev, C., Sohag, K., & Hammoudeh, S. (2024). Economic uncertainty, public debt and non-performing loans in the Eurozone: Three systemic crises. *International Review of Financial Analysis*, 93(C). https://doi.org/10.1016/j.irfa.2024.103282

Farah, E., Austen, M., Carchen, E., & Oliver Wyman. (2022). *The implications of high inflation on the European banking industry. In The Implications of High Inflation on the European Banking Industry*. https://www.oliverwyman.com/our-expertise/insights/2022/jun/impact-of-inflation-european-banking.html

Converse, N., & Jain, A. K. (2024, June). *Do banks gain from inflation? Evidence from inflation surprises*. Federal Reserve Board of Governors. https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.aeaweb.org/conference/2025/program/paper/ZiE76fYQ&ved=2ahUKEwjBzLi6xPaNAxW_SPEDHbz-O9oQFnoECBEQAw&usg=AOvVaw3jVqu8XdwERL0td2zX0tuA

Karkowska, R., Korzeb, Z., & Niedziółka, P. (2025). Inflation's dual impact on European banks' profitability. *Journal of Policy Modeling*, 47(1), 64-77. https://doi.org/10.1016/j.jpolmod.2024.10.007

. Bergant, K., Hakamada, M., Kirti, D., & Mano, R. (2025, February 13). *Inflation and Bank Profits—Monetary Policy Trade-offs*. International Monetary Fund. https://www.imf.org/en/Publications/WP/Issues/2025/02/13/Inflation-and-Bank-Profits-Monetary-Policy-Trade-offs-545281

KPMG, & Lagarde, C. (2020). *Financial resilience in banking: a balancing act*. In The New Reality Publication Series [Report]. https://assets.kpmg.com/content/dam/kpmgsites/xx/pdf/2020/12/financial-resilience-in-banking.pdf

Dumitrache, G. (2025a, January 20). Implementarea noului cadru Basel IV - Institutul Bancar Român. Institutul Bancar Român. https://www.ibr-rbi.ro/15890/implementation-of-the-new-basel-iv-framework-online-2/

Appendix

Annex no. 1 – Data used in the analysis
Annex no. 2 – Descriptive statistics

	NPL	GDP	HCIP	Unemployment	Securitised_loans	Euribor	Debt_ratio
Mean	3.52	3,035,990.52	2.36	7.65	(0.60)	0.36	74.27
Standard Error	0.26	22,176.71	0.44	0.15	0.56	0.23	0.52
Median	2.97	3,040,276.76	1.40	7.45	(0.20)	(0.32)	73.93
Mode	#N/A	#N/A	1.40	7.47	(7.60)	#N/A	#N/A
Standard Deviation	1.62	138,493.50	2.74	0.96	3.52	1.46	3.26
Sample Variance	2.61	19,180,449,033.39	7.49	0.92	12.40	2.12	10.64
Kurtosis	(0.89)	(0.19)	1.45	(0.94)	(0.27)	1.76	(0.03)
Skewness	0.70	(0.43)	1.52	0.44	(0.69)	1.83	0.13
Range	5.02	568,016.68	10.30	3.11	12.90	4.52	13.37
Minimum	1.83	2,660,459.80	(0.30)	6.37	(8.80)	(0.57)	67.90
Maximum	6.84	3,228,476.48	10.00	9.48	4.10	3.96	81.27
Sum	137.43	118,403,630.45	92.20	298.29	(23.30)	13.87	2,896.55
Count	39.00	39.00	39.00	39.00	39.00	39.00	39.00