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Research paper

What Drives Non-Performing Loans in Italy? A Macro Financial Perspective from 2005 To 2024

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Abstract

This study analyzes the macro-financial factors that explain Italian banking sector non-performing loans (NPLs) from 2005 to 2024, years marked by unprecedented economic and political volatility. Using the Autoregressive Distributed Lag (ARDL) model, the study accommodates both the short-run dynamics and long-run relationship among NPLs and four driving factors: unemployment, domestic credit, lending rates, and political stability. The results show that, in the long run, high unemployment, rapid credit growth, and rising lending rates have substantial contributions to an increase in NPLs, whereas political stability plays a mitigating role. The results are supplemented with Granger causality tests given in terms of future values of NPLs at the lagged explanatory variables phase. Diagnostic and stability tests confirm the robustness of the model. These findings underscore the need for a concerted policy response towards reforming labor markets, prudent credit risk management, monitoring interest rate sensitivity, and institutional building. In providing contemporaneous and context-specific evidence, the paper contributes to financial vulnerability in Italy and offers real-world policy insights into banking regulation and macroeconomic policy design.

Keywords: *Domestic Credits; Lending Rates; Non-Performing Loans; Political Stability; Unemployment.*

1. Introduction

The soundness of the banking sector is a pillar of macroeconomic stability, and NPLs pose one of the most important risks to financial systems, particularly for countries with unsound economic fundamentals. NPLs, also termed as delayed or defaulting loans, not only erode bank profitability and capital base but also constrain credit supply and decelerate growth (Beck et al., 2015). Identifying and understanding the deep-rooted macro-financial determinants of NPLs is therefore paramount to building effective policies to promote financial stability.
While most studies have concentrated on the determinants of NPLs globally, the Italian case is different in that the nation was seriously plagued by elevated NPL ratios, especially following the financial crisis of 2008 and the 2011–2013 Eurozone sovereign debt crisis. The year 2015 registered Italy with the largest stock of NPLs in the European Union in absolute terms, creating systemic issues and prompting a response from regulators (European Central Bank, 2017). Despite the subsequent improvements, structural problems such as high unemployment, political fragmentation, and uneven credit allocation have continued to affect the resilience of Italy's banking system (International Monetary Fund, 2023).
The Italian case is particularly interesting to empirically study due to the match between macroeconomic volatility and institutional richness there. The country has been exposed to sudden swings in unemployment, credit activity, and political stability over the last few years, variables usually recognized as strong forces to explain NPL dynamics (Foglia, 2022). Nevertheless, little comprehensive, dynamic evidence exists that takes both the short-run and long-run effects of these determinants on NPLs in Italy into account within a rigorous econometric framework.
To address this gap, this present study utilizes the Autoregressive Distributed Lag (ARDL) framework to investigate the effect of unemployment, domestic credit, lending interest rates, and political stability on NPLs in Italy from 2005 to 2024. With a focus on both short- and long-run dynamics, the study presents new country-level evidence that contributes to the overall literature and informs financial regulation and macroeconomic policy.
The rest of the paper is organized as follows: Section 2 is a literature review on how the selected independent variables affect non-performing loans. Section 3 is the model specification and methodological approach. Section 4 is where the empirical evidence is presented and interpreted, and Section 5 is the concluding remarks and key policy implications.

2. Literature Review

Understanding the determinants of non-performing loans (NPLs) has been a general concern among researchers and policymakers, particularly in economies that have suffered from a long-lasting episode of financial stress. There have been numerous studies that study macroeconomic, financial, and institutional determinants driving NPL build-up, with more attention being paid to cross-country differences and over time. In the context of Italy, a country that has experienced constant economic downturns, banking vulnerabilities, and political instability, the dynamics of NPLs require close examination. The literature offers a wide set of explanatory variables ranging from unemployment and domestic credit growth to loan interest rates and political control variables such as political stability, all of which are affected by credit risk through complex transmission mechanisms. This section briefly overviews the most relevant empirical studies examining each of these variables, with particular focus on studies that have examined their effects within the Italian banking sector or comparable European settings. By synthesizing these findings and integrating recent global and region-specific evidence, this review positions the current study within the existing body of knowledge and identifies the empirical gaps it aims to address, particularly the need for a dynamic, country-specific analysis that incorporates institutional factors.

2.1. Unemployment rates and non-performing loans

Unemployment has often been cited as a primary macroeconomic driver of NPLs. Higher unemployment reduces the ability of borrowers, especially households, to repay their loans and thus increases the likelihood of loan defaults. Messai and Jouini (2013), using a dataset of Italian banks, established that higher unemployment strongly drives higher NPLs, due to the impact of labor market conditions on borrower solvency. Similarly, Foglia (2022) confirmed a positive and significant relationship between the unemployment rate and Italian levels of NPLs, noting how macroeconomic shocks hitting the job category obviously deteriorate credit quality. This is consistent with overall international evidence, for example, Akinlo and Emmanuel (2014), who also defined a similar relationship in the Nigerian banking system. It is supported by the recent cross-country investigation of Salas et al. (2024), in which the data of 1,631 banks in 111 countries were analyzed, that unemployment is a positive and significant determinant of NPLs in every region of the world. It demonstrates the global vulnerability of banking systems to the deterioration of labor markets. Offering a regional perspective for South Asia, Begum and Haq (2025) also identify unemployment as an important macroeconomic determinant of NPLs in the region. Two-way Granger causality between unemployment and NPLs prevalent in the literature suggests a vicious cycle: rising defaults tighten bank lending, which slows down economic activity and further worsens the prospects for employment (Balgova et al., 2016). For Italy, structural rigidities and high youth unemployment have historically amplified this feedback loop, making labor market reforms a critical component of financial stability policy.

2.2. Domestic credits and non-performing loans

Rapid or excessive growth in domestic credit has been identified as a major contributor to NPL stock. In Italy, Cincinelli and Piatti (2017) pointed out that uncontrolled growth in credit, particularly in the case of poor supervision, was behind rising NPLs. They also attributed it to moral hazard behavior as well as poor regulatory pressure. Foglia (2022) also highlighted a strong positive relationship between domestic credit and NPLs, holding part of the increase in bad loans due to easy lending standards and credit misallocation. Regionally, Curak et al. (2013) also identified similar results for Southeastern European economies, where credit booms were often followed by sharp increases in NPLs. The global analysis by Salas et al. (2024) provides nuanced insights, showing that the relationship between credit growth and NPLs is positive and significant in several regions, including Africa, North America, and South and Central America. This reinforces the view that credit growth, if not managed prudently, is a common source of systemic risk. These assessments collectively highlight the critical importance of effective credit risk management, stringent loan monitoring, and counter-cyclical macroprudential policies to safeguard financial stability.

2.3. Lending rates and non-performing loans

Lending interest rates affect loan performance by setting the cost of borrowing. Higher interest rates increase the cost of repayment, especially for financially stressed borrowers, hence increasing default risks. Beck et al. (2015) in a global study confirmed that higher interest rates are associated with higher NPL ratios across most countries, particularly in financially underdeveloped nations. Consistent findings were reported by Curak et al. (2013), who noted that interest rate volatility was responsible for loan performance erosion in Southeastern Europe. Even though Italy is governed by the European Central Bank's monetary system, market lending rate fluctuations, particularly during the sovereign debt crisis, had meaningful effects on credit quality, particularly for small and medium-sized enterprises.

The study by Salas et al. (2024) offers compelling corroborating evidence from a global perspective, identifying interest rates as a significant and positive determinant of NPLs across all regions in their sample of 1,631 banks. This confirms that the cost of credit is a fundamental and universal driver of credit risk.

Adding a novel methodological perspective, Rasid Bakır et al. (2025) utilize a deep learning technique with causal inference to analyze NPLs in Türkiye. Their findings robustly confirm that interest rates are a key macroeconomic driver of NPLs, providing advanced, data-driven validation of the established theoretical relationship. This suggests that the positive link between lending rates and NPLs is not only in traditional econometric models but also when examined through more complex, non-linear machine learning frameworks.

The Granger causality results in our analysis, which indicate that lending rates predict NPLs, further underscoring the importance of monitoring credit affordability and the financial stability implications of monetary policy decisions.

2.4. Political stability and non-performing loans

Institutional quality, captured by political stability, legal enforcement, and regulatory effectiveness, has been seen as a catalyst for NPLs. Instability in politics may reduce investor confidence, delay loan repayment, and discourage the enforcement of contracts. Although comparatively not researched within the Italian context, other country studies nevertheless do provide compelling evidence. Rawashdeh et al. (2023) demonstrated that political instability in Jordan highly correlates with rising NPLs, whereas Zegarra (2016) established that instability in Peru impacts the non-price terms of loans negatively, ultimately leading to increased credit risk. Christodoulou-Volos (2025) demonstrated the same outcome for Cyprus and concluded that political risk erodes borrower behavior and incentives for repayment.

The most robust and relevant evidence in favor of this variable is offered by Rehman et al. (2025), who specifically studied the connection between country governance and NPLs in South Asian countries. Their article, applying a fixed-effects model to a dataset of 81 conventional banks, determined that the primary governance indicators, political stability, rule of law, and government effectiveness, have a significant negative impact on NPLs. This means that the quality of governance directly contributes to the reduction of problem loans. Their robustness tests using a composite governance indicator (CG-AVG) also confirmed that improved levels of country governance consistently reduce NPLs. This finding is significant in that it elevates the discussion from naive political stability to a broader, more measurable concept of country governance, with strong empirical evidence in favor of its inclusion in NPL models.
For Italy, a history of government instability, weak coalition, and policy uncertainty, especially following the Eurozone debt crisis, is likely to have contributed to fueling economic instability as well as to detracting from the asset quality of the banking system. Strong policymaking and governance reforms can therefore be powerful, but indirect, tools for promoting financial stability.

2.5. Synthesis of literature and research gap

Briefly, the existing literature confirms the relevance of macroeconomic and institutional determinants such as unemployment, credit expansion, lending rates, and political stability to explaining non-performing loans. The emerging consensus from recent global studies (Salas et al., 2024), regional analyses (Begum and Haq, 2025), and advanced methodological approaches (Rasid Bakır et al., 2025) underscores that these relationships are pervasive and robust across diverse economic contexts and analytical frameworks. Furthermore, the critical role of institutions is now firmly established, with Rehman et al. (2025) providing a clear blueprint for integrating multidimensional governance indicators into the analysis of credit risk. However, a critical gap remains in the application of a holistic and dynamic framework to the Italian case over a long and turbulent time span. While the studies establish general relationships, few have simultaneously modeled the short- and long-run effects of these determinants alongside a direct measure of institutional quality like political stability for Italy. This study contributes to the literature by applying the ARDL model to estimate both the short-run dynamics and long-run equilibrium relationships between NPLs and their key determinants, including the often-overlooked variable of political stability, in the Italian banking system from 2005 to 2024. In doing so, it provides fresh, contextual evidence that bridges macroeconomic and institutional analysis, offering valuable insights for policymakers and financial regulators tasked with ensuring banking sector resilience.

3. Model and Methodology

3.1. The model

This study analyses the determinants of non-performing loans (NPL) in Italy from 2005 to 2024 by employing significant macro-financial factors like unemployment, domestic credit, lending rates, and political stability. They have been selected because they have theoretical and empirical consequences in the credit risk and financial stability literature. Unemployment captures the labor market situation and repayment ability of borrowers, while domestic credit captures credit availability and financial sector depth, which can impact loan performance. Lending rates capture the cost of borrowing and default risk, and political stability captures institutional quality and governance, which build economic confidence and financial sector stability. While other macroeconomic indicators, such as GDP growth, inflation, and exchange rates, are often cited in the literature as potential determinants of NPLs, their initial incorporation into our model specification caused serious statistical problems. Specifically, we experienced issues of multicollinearity, which can confuse the individual effect of each variable, and stationarity characteristics that did not agree with the ARDL bounds testing procedure. To preserve the parsimony, stability, and interpretive simplicity of our ultimate model, we, from now on, focused attention on this core group of macro-financial and institutional determinants, which, as a group, encompasses the key dimensions of credit risk in the Italian situation without compromising the statistical integrity of the model.
More information about data and sources used may be found in the informative Table 1 shown below.

Table 1: Variable Description

Variable	Symbol	Measurement units	Data sources
Non-Performing Loans	LnNPL	Non-performing loans to total gross loans ratio	World Development Indicators
Unemployment Rate	LnUR	Unemployment, total (% of total labor force)	World Development Indicators
Domestic Credit	LnDC	Domestic credit to private sector (% of GDP)	World Development Indicators
Lending Interest Rate	LnLR	The rate charged by banks on loans to prime customers (%)	World Development Indicators
Political Stability	LnPS	Political Stability and Absence of Violence/Terrorism (-2.5 weak; 2.5 strong)	World Development Indicators

The empirical model is therefore specified as (Equation 1):

$$LnNPL_t = \alpha_0 + \alpha_1 LnUR_t + \alpha_2 LnDC_t + \alpha_3 LnLR_t + \alpha_4 LnPS_t + \varepsilon_t \quad (1)$$

Where Ln denotes the natural logarithm transformation, NPL refers to the non-performing loans ratio; UR denotes the unemployment rate; DC refers to domestic credit; LR indicates the lending interest rate; and PS refers to the political stability index. Also α_0 is the constant term, α_1 to α_4 denote the long-run elasticities of the respective explanatory variables. The Autoregressive Distributed Lag (ARDL) approach is employed to determine both the short-run dynamics and long-run equilibrium relationship between NPL and its determinants.

3.2. Estimation method

We employ the Autoregressive Distributed Lag (ARDL) bounds testing method to test for the long-run and short-run connection between non-performing loans (NPL) and their macro-financial determinants in Italy. The ARDL method offers several significant advantages that render it particularly well-suited for this examination. Unlike other cointegration techniques, ARDL does not involve the requirement of like-orders of variables and thus can be applied if there exists a mix of integration orders of variables, I(0) and I(1). It also performs well with relatively small sample sizes, which is crucial in the present study horizon of 2005–2024. Using this method, short-run dynamics and long-run equilibrium relationships can be estimated simultaneously, providing a straightforward insight into the determinants of credit risk (Pesaran et al., 2001). All these attributes of the ARDL model make it an appropriate choice for estimating how political stability, lending

rate, domestic credit, and unemployment interact to drive Italy's level of non-performing loans. The ARDL model specification for this study is given as (Equation 2):

$$\Delta LnNPL_t = \alpha_0 + \lambda_1 LnNPL_{t-1} + \lambda_2 LnUR_{t-1} + \lambda_3 LnDC_{t-1} + \lambda_4 LnLR_{t-1} + \lambda_5 LnPS_{t-1} + \sum_{k=1}^{n} \alpha_1 \Delta LnNPL_{t-k} + \sum_{k=1}^{n} \alpha_2 \Delta LnUR_{t-k} + \sum_{k=1}^{n} \alpha_3 \Delta LnDC_{t-k} + \sum_{k=1}^{n} \alpha_4 \Delta LnLR_{t-k} + \sum_{k=1}^{n} \alpha_5 \Delta LnPS_{t-k} + \varepsilon_t \quad (2)$$

Where Δ denotes the first-difference operator, while the short-run dynamics are captured by the coefficients α_1 to α_5, and the long-run relationships are represented by the coefficients λ_1 to λ_5.

Diagnostic post-estimation checks were performed to analyze the appropriateness and stability of the ARDL model utilized in this study. These included tests for normality of residuals, serial correlation, and heteroskedasticity. The model's stability was further tested with Brown et al.'s (1975) cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests to ascertain long-run parameter stability. To better investigate the causality direction between the variables, the Granger causality test will be employed, which will provide some information on dynamic links between non-performing loans and their macro-financial determinants. The ARDL model is strongly appropriate for this reason due to its flexibility in dealing with variables of different orders of integration and its strong performance in coping with relatively small sample sizes.

4. Results and Discussion

4.1. Descriptive statistics

Table 2 presents the descriptive statistics of the variables.

Table 2: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
LnNPL	20	2.036	0.668	0.824	2.894
LnUR	20	2.194	0.226	1.804	2.540
LnDC	20	4.381	0.125	4.104	4.539
LnLR	20	1.392	0.367	0.706	1.922
LnPS	20	-0.806	0.203	-1.228	-0.539

The descriptive statistics (Table 2) show significant patterns. Non-performing loans (LnNPL) have a mean of 2.036 with large variability (Std. Dev.=0.668) and a wide range of 0.824 to 2.894 to indicate large financial distress variation over the period in observation. Unemployment (LnUR) has a high mean of 2.194, with stable but still considerable variation (Std. Dev.=0.226), ranging from 1.804 to 2.54, to validate persistent labor market adversity. Domestic credit (LnDC) is also steady with a high mean of 4.381 and minimal variation (Std. Dev.=0.125), fluctuating narrowly between 4.104 and 4.539, reflecting stable credit provision. Lending rates (LnLR) are of the order of 1.392 with moderate variation (Std. Dev.=0.367) and ranging between 0.706 and 1.922, suggesting reactive changes in monetary policy. Political stability (LnPS) values are all negative (mean=-0.806, range=-1.228 to -0.539), reflecting long-standing governance problems.

These statistics peg Italy's twin reality: calm credit markets (domestic credit variation <3%) and volatile NPLs (32.8% coefficient of variation), and deeply rooted unemployment, against the backdrop of political instability. The broad 2.6-fold range between minimum and maximum NPL levels is a reflection of the economy's vulnerability to financial shocks, whereas the tight 1.1-fold spread of domestic credit is proof of banking system resilience.

4.2. Unit root test

Unit root tests, i.e., the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, were executed to examine the stationarity properties of variables used in this study. Unit root tests are crucial in time series analysis as they provide inputs toward making correct model selection and avoiding spurious regression results. Identification of the order of integration is required for the selection of suitable econometric models, such as the Autoregressive Distributed Lag (ARDL) model and error correction processes. In addition, stationarity guarantees accurate estimation of the long-run relationship and enhances forecasting validity. Results of unit root tests confirming all of the variables are integrated of order one [I(1)] are presented in Table 3.

Table 3: The Unit Root Test Results

Variable	ADF Level Prob.	1st Diff. Prob.	PP Level Prob.	1st Diff. Prob.	Remarks
LnNPL	0.3695	0.0637*	0.3552	0.0804*	I(1)
LnUR	0.6235	0.0115**	0.5547	0.0124**	I(1)
LnDC	0.4492	0.0075***	0.4929	0.0075***	I(1)
LnLR	0.5459	0.0019***	0.5459	0.0050***	I(1)
LnPS	0.5072	0.0000***	0.4468	0.0000***	I(1)

Note: *, **, and *** indicate 10%, 5% and 1% significance levels, respectively.

As presented in Table 3, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test results indicate that all variables are integrated of order one [I(1)]. This is seen in the non-stationarity of all variables at their levels (p-values > 0.05) and stationarity upon first differencing (p-values < 0.10 for most variables, with some significant at 1% or 5% levels). These findings are especially convenient in the estimation of the ARDL model, one that can be applied to parameters of different orders of integration, a mix of I(0) and I(1) parameters. The fact that all our parameters are I(1) means that we can effectively apply the ARDL model.

4.3. Determining the optimal lag structure in the ARDL model

The lag selection results, Table 4, depict the best order of lag as 1 for the ARDL model, as evidenced by its selection via a range of information criteria, including AIC, FPE, HQ, and the LR test.

Table 4: Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	29.4109		5.27e-08	-2.5696	-2.3210	-2.5275
1	107.4589	106.8025*	2.21e-10*	-8.1536*	-6.6623	-7.9012*

* Indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan–Quinn information criterion.

The constrained ARDL (1,0,1,0,0) model with variable order (LnNPL, LnUR, LnDC, LnLR, LnPS) demonstrates notable dynamics in the interaction between non-performing loans and determinants. The inclusion of a lagged autoregressive term on LnNPL suggests that past values of non-performing loans influence the current ones, so there is persistence in financial trouble. Domestic credit (LnDC) similarly involves a lag term, suggesting that changes in credit circumstances are not quickly reflected in loan performance. Contrary to this, unemployment (LnUR), lending rates (LnLR), and political stability (LnPS) are lag-free and included in the model, implying the respective impacts on non-performing loans are contemporaneous, as opposed to gradual or lingering. Such specification accommodates model simplicity and economic intuition by capturing both permanent impacts and one-period shocks.

4.4. ARDL bound test

Table 5 presents the results of the bounds test, which helps determine whether a long-run relationship (cointegration) exists among the variables. This test also supports the estimation of both short-run dynamics and long-run equilibrium effects within the ARDL framework.

Table 5: ARDL F-Bound Test for Cointegration

F-Bound Test	Null Hypothesis: No levels of relationship			
ARDL Lag model		(1,0,1,0,0)		
Test statistic	Value	Significance level	I(0)	I(1)
F-statistic	10.19036	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

The results of the ARDL bounds test, presented in Table 5, confirm the existence of a long-run relationship between the variables employed in the model. The estimated F-statistic value of 10.19 is larger than the upper critical bounds (I(1)) of all conventional significance levels, like 10%, 5%, 2.5%, and 1%. This implies the null hypothesis of the lack of level relationship can be rejected with strong evidence of cointegration among non-performing loans, unemployment, domestic credit, lending rates, and political stability. It is thus appropriate to estimate the long-run coefficients and the short-run dynamics of the model, encompassing the error correction term, to explain the rate at which the system gets back to equilibrium after short-run shocks.

4.5. Long-run and short-run analysis of the ARDL model

The findings of the ARDL model are presented in Table 6.

Table 6: Long-Run and Short-Run Elasticities

Dependent variable: LnNPL			
Variable	Coeff.	t-stat.	Prob.
Long–run coefficients			
LnUR	1.025*	2.039	0.064
LnDC	4.326***	3.565	0.004
LnLR	1.246***	4.140	0.001
LnPS	-1.092**	-2.993	0.011
C	-21.897***	-4.529	0.001
Short-run coefficients			
D(LnDC)	0.526	1.400	0.187
CointEq(-1)	-0.455***	-9.307	0.000
R-Square	0.8299		
AdjustedR^2	0.8199		
Breusch-Godfrey Serial Correlation LM Test		1.272	0.283
Heteroskedasticity Test: ARCH		2.424	0.139
Jarque-Bera		0.161	0.922
Ramsey RESET Test		0.195	0.849

Note: *, **, and *** indicate 10%, 5% and 1% significance levels, respectively.

The ARDL estimation results show important long-run and short-run relationships between the selected macroeconomic variables and non-performing loans (LnNPL) in Italy. In the long run, unemployment (LnUR) is positively and borderline significantly correlated with NPLs, with a point estimate of 1.025 ($p = 0.064$), which means that a rise in unemployment by 1% would increase NPLs by approximately 1.03%. LnDC and LnLR have a positive as well as statistically significant impact on the NPL. Coefficients for LnDC and LnLR are 4.326 ($p = 0.004$) and 1.246 ($p = 0.001$), respectively, indicating that loans with higher credit and borrowing rates are highly correlated with default rates. Conversely, political stability (LnPS) is negatively correlated with NPLs with a coefficient of -1.092 ($p = 0.011$), showing that improvements in governance and institutional quality decrease credit risk.

In the short run, the first-differenced domestic credit variable (D(LnDC)) is statistically insignificant ($p = 0.161$), implying no immediate effect on NPLs. The finding that domestic credit is statistically insignificant in the short term, though it has a significant positive long-run impact, owes much to the processes of credit cycles and recognition lags. An increase in credit does not immediately reduce the quality of loans. There is a built-in timing disparity, often referred to as a 'recognition lag', between when a loan is extended and when it will hopefully turn non-performing, typically following a period of borrower financial distress or recession. In the short run, increased credit even has the

effect of heightening repayment capability in the short run by infusing liquidity into borrowers. However, in the long term, sustained and high-velocity credit growth, especially if it leads to more lenient lending standards or financing of less productive assets, accumulates systemic risk. This risk materializes later on, leading to a sudden spike in NPLs, as captured by the significantly positive long-run coefficient. This follows the 'boom and bust' credit cycle phenomenon that is often observed during banking crises. Finally, the error correction term (CointEq(-1)) is negative and highly significant (–0.455, $p < 0.01$), pointing to the existence of a stable long-run equilibrium, where approximately 45.5% of deviations from the long-run path are corrected each year. The model is highly explanatory because the R-squared is 83% and the adjusted R-squared is 82%.

Post-estimation diagnostics indicate the model to be well-specified. The Breusch-Godfrey LM test indicates no serial correlation ($p = 0.283$), while the ARCH test indicates no heteroskedasticity ($p = 0.139$). Also, the Jarque-Bera test confirms normality of residuals ($p = 0.922$), and the Ramsey RESET test confirms correctness of functional form ($p = 0.849$). Overall, the ARDL model is statistically sound and robust in capturing the short- and long-run determinants of non-performing loans in the Italian banking sector.

The stability of the ARDL model's long-run parameters was confirmed by the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests (Brown et al., 1975). As shown in Fig.1 and Fig.2, the statistics remain within the 5% critical bounds, indicating no significant structural breaks over the sample period. This finding is crucial as it validates the model's robustness and the reliability of our policy inferences, even across a period marked by significant economic shocks. This confirms that there are no structural breaks in the model and that the relationships between non-performing loans and their macro-financial determinants remain stable over the study period. These stability test results also add to the model's credibility for inference and policy analysis.

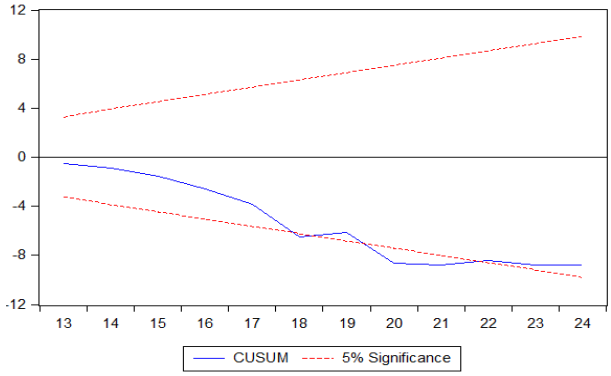

Fig. 1: Plot of the Cumulative Sum (CUSUM) Of Recursive Residuals. the Solid Blue Line Remaining within the 5% Critical Bounds (Red Dashed Lines) Indicates Stability of the Long-Run Coefficients Throughout the Sample Period (2005–2024).

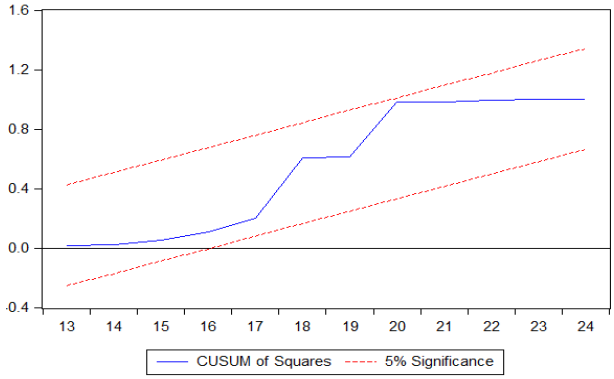

Fig. 2: Plot of the Cumulative Sum of Squares (CUSUMSQ) of Recursive Residuals. The Solid Blue Line Fluctuating within the 5% Significance Levels Confirms the Constancy of the Error Variance and Further Supports the Model's Parameter Stability.

4.6. The Granger causality test

The findings of the Granger causality tests examine the directional relationships between non-performing loans (NPLs) and their determinants in Italy. By testing if the past values of a variable increase the predictability of the other, these tests reveal the causal dynamics between NPLs and macroeconomic variables. The findings identify the existence of significant one-way or two-way causal flows, which provide valuable information about which variable drives NPLs and also whether feedback effects exist. This study determines whether unemployment, credit conditions, lending rates, or political stability are leading indicators of distress in the banking sector, or whether, instead, NPLs themselves influence these macroeconomic variables. The results have important implications for policymakers who seek to preempt financial instability through targeted intervention. The results of the Granger causality test are shown in Table 7.

Table 7: The Granger Causality Test Results

Null Hypothesis	F-Statistic	Prob.
LnUR does not Granger-cause LnNPL	6.843**	0.019
LnNPL does not Granger-cause LnUR	6.901**	0.018
LnDC does not Granger-cause LnNPL	9.027***	0.008
LnNPL does not Granger-cause LnDC	0.632	0.438
LnLR does not Granger-cause LnNPL	12.024***	0.003
LnNPL does not Granger-cause LnLR	4.091*	0.060
LnPS does not Granger-cause LnNPL	12.924***	0.002
LnNPL does not Granger-cause LnPS	5.957**	0.027

Note: *, **, and *** indicate 10%, 5% and 1% significance levels, respectively.

The results of the Granger causality tests are insightful in terms of directional associations between non-performing loans (LnNPL) and their macro-financial factors. The findings provide bidirectional Granger causality from unemployment (LnUR) to NPLs, and vice versa, as in both directions there is statistical significance at the 5% level, thereby suggesting that unemployment and NPLs influence each other through a feedback mechanism. Additionally, lending rates (LnLR) and domestic credit (LnDC) are both Granger-caused by NPLs at 1% level, implying that changes in credit conditions and borrowing costs are indicative of the development in loan defaults. Political stability (LnPS) also Granger causes NPLs, adding once again to the dependency on institutional quality and governance for credit risk determination.

4.7. Discussion

The strong and positive long-term effect of the unemployment rate on NPLs indicates the vulnerability of Italian households and businesses to poor labor market conditions. Italy's unemployment rate was structurally high, particularly during the severe economic shocks such as the 2008 global financial crisis, the Eurozone debt crisis of 2011–2013, and the COVID-19 pandemic. Unemployment rose throughout these phases, more than 12% in 2014, eroding borrowers' capacity to repay and leading to a sharp rise in defaults (OECD, 2021; Eurostat, 2023). Bidirectional Granger causality between unemployment and NPLs suggests a feedback process: rising defaults reduce the willingness or capacity of banks to lend, which reduces economic activity and worsens labor market performance (Balgova et al., 2016). These relationships reinforce the call for active labor market policies and labor market resilience to balance out financial system stress. For the case of Italy, structural labor market rigidities and youth unemployment have been chronic problems, which further intensify financial fragility during the recession. Combating unemployment is therefore critical for social well-being as well as providing financial stability.

The long-run relationship of domestic credit (LnDC) is positive and highly significant in our ARDL model, indicating a strong link between credit growth and non-performing loan build-up (NPLs) in Italy. This result is in keeping with previous research that has established threats of fast or misleading credit growth. Cincinelli and Piatti (2017) found that domestic credit growth, particularly in the SMEs, was strongly linked with deterioration in loan quality in Italy. Similarly, Foglia (2022) emphasized the impact of credit structure and macro-financial environment on NPLs, whereas Messai and Jouini (2013) found a long-run positive relationship between domestic credit and non-performing loans in the Italian example, as given in this study as well. Our Granger causality test also corroborates that domestic credit is a superior explanatory variable for NPLs, hence validating its leading position in financial instability. This assumes greater significance because Italy has experienced persistent structural issues in the distribution of credit, inter-regional disparities, and inefficiency in lending to small and medium-sized enterprises.

In the long run, our ARDL estimate shows a statistically significant and positive link between lending rates (LnLR) and non-performing loans (NPLs) such that higher borrowing costs do generate higher credit risk for Italian banks. It is in line with previous empirical observations suggesting that higher interest rates are likely to raise default rates, particularly in economies that have high debt burdens and low borrower resilience. For example, Beck et al. (2016) discovered the presence of a high positive correlation between interest rates on lending and NPLs in a cross-country panel of countries, while Curak et al. (2013) experienced similar effects in banking systems within Southeastern Europe. These experiences support our findings by confirming that credit costs are a significant driver of loan performance deterioration. In the case of Italy, episodes of harsh credit conditions, such as during the Eurozone debt crisis or in response to policy shifts by the ECB, have amplified SMEs' and household loan repayment difficulties. Our analysis's Granger causality results also validate lending rates' contribution to predictability, underscoring the significance of effective interest rate transmission and surveillance of credit affordability in maintaining financial stability.

Our ARDL results indicate that political stability (LnPS) has a significant long-run adverse effect on non-performing loans (NPLs), supporting that improved governance and institutional quality reduce credit risk in the Italian banking industry. This reflects the more general applicability of political and institutional contexts in influencing financial outcomes. In Italy, repeated government turmoil, coalition instability, and fiscal policy uncertainty, especially during critical times such as the Eurozone debt crisis, have long been the cause of greater economic and financial volatility. They can erode investors' and consumers' confidence and thereby erode borrowers' ability to repay loans and increase default risk. Conversely, times of more political stability and administrative continuity have encouraged better credit terms and better loan performance. The Granger causality results in our paper confirm that political stability not only correlates with but is also employed to predict changes in the levels of NPLs, underscoring the importance of stable governance in securing the soundness of the financial system.

5. Conclusion and Policy Implications

This study has investigated Italian non-performing loans (NPLs) macro-financial determinants between the years 2005-2024 using the Autoregressive Distributed Lag (ARDL) method to reveal both short-run and long-run effects. From the findings, higher unemployment, higher domestic credit, and higher lending rates are noted to increase NPLs in the long run, while higher political stability reduces NPLs. These findings also directly apply in interdisciplinary fields, particularly in accounting processes and economic stability in general. The high long-term relationship between macro-financial drivers and NPLs emphasizes the central role that forward-looking loan loss provisioning plays within accounting frameworks such as IFRS 9. Regulators and banks must use models incorporating macro variables such as unemployment, credit growth, and political stability forecasts to calculate more accurate Expected Credit Loss (ECL) provisions. This allows bank balance sheets to be closer to economic reality, resulting in increased transparency and investor confidence.

At a macroeconomic level, the two-way relationship that we derived between NPLs and unemployment indicates a dangerous feedback loop. Higher NPLs constrict credit supply, leading to reduced investment and consumption, which further suppresses GDP growth and contributes to unemployment. The vicious cycle highlights that NPL management is not a banking sector concern only, but a critical component of long-term macroeconomic stability and growth. Thus, NPL resolution strategies are necessarily linked with facilitating investment-friendly situations and an economic revival environment.

These findings have several policy implications. First, labor market reforms need to reduce structural unemployment, particularly among young people and in the south of Italy, through training in skills, high-skill job creation policies, and improving support to labor mobility. Second, banking needs to enhance credit risk management systems through the adoption of stricter borrower screening, advocating stricter loan monitoring regimes, and implementing early warning mechanisms, especially in times of high credit growth. Third, monetary authorities need to consider the broader financial stability implications of interest rate measures to ensure that rate hikes do not unfairly penalize weak borrowers. Fourth, political and institutional reforms to maximize the efficiency of government, reduce policy uncertainty, and enhance regulatory coherence are paramount in order to maintain investor confidence and financial market stability. In addition, inducing

deeper coordination among fiscal, monetary, and financial regulation institutions is likely to build a more forward-looking response framework to newly rising risks. Applying these interconnected issues can assist Italy in enhancing resilience in its financial institutions, mitigating the accumulation of non-performing loans, and encouraging more stable economic growth.

This study also opens several avenues for future research. To begin with, the connection between accounting reporting and NPLs is one that would be worth investigating in more detail; one such avenue would be looking at how these determinants influence banks' provisioning behavior directly under IFRS 9 and the effects on earnings volatility and capital adequacy. Second, the realized link between macroeconomic variables and NPLs needs to be empirically examined to explicitly model the impact of NPL resolution on growth and investment, using the application of dynamic stochastic general equilibrium (DSGE) models or otherwise. Finally, further research can extend this model using a comparative study with other Southern European economies or by introducing bank-specific variables, such as the structure of ownership and efficiency, to have a more specific picture of the determinants of credit risk.

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Data Availability Statement

The dataset generated and analyzed during the current study is available from the corresponding author upon reasonable request.

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