

Differential Impact Of Macroeconomic And Monetary Conditions On Non-Performing Loans By Debtor Category: Evidence From The Moroccan Banking System.

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Abstract

This study examines the impact of macroeconomic and monetary conditions on non-performing loans (NPLs) across various loan categories in Morocco from 2009 to 2024, utilizing the Autoregressive Distributed Lag (ARDL) approach. The results reveal that the NPL rate for households is not significantly influenced by long-term systemic factors, whereas non-financial firms are considerably affected by macroeconomic conditions. In the short term, inflation emerges as a crucial factor that positively influences NPLs for both households and corporations, with a more significant effect observed among households. Currency depreciation appears to bolster the financial stability of non-financial corporations, while negatively impacting households, though its effect weakens over time. Additionally, higher interest rates are linked to a temporary reduction in NPLs, as they tend to discourage borrowing. Interestingly, an increase in the money supply generally raises NPL rates for non-financial firms but lowers them for households, as increased access to funds allows individuals to better fulfill their financial obligations. These findings underscore the differential effects of external conditions on NPLs for non-financial firms compared to households. Therefore, financial institutions should consider these economic factors and their distinct impacts when assessing asset quality, and policymakers should take into account the varying influences of macroeconomic elements on the financial health of different institutional sectors when devising macroprudential policies.

Keywords

Non-performing loans, macroeconomic and monetary conditions, impact, Morocco.

Introduction

The banking system plays a crucial role in the economy by facilitating the mobilization of savings from individuals and institutions, and by allocating these funds to areas where they can be most effectively utilized, such as business investments and consumer loans (Bernanke, 2000). The stability of the banking system is essential for ensuring smooth financial transactions and maintaining overall economic stability. A significant illustration of the consequences of banking instability can be seen in the financial crisis of 2007-2008, which highlighted how the failure of major financial institutions can trigger widespread economic disruption, resulting in job losses, decreased consumer spending, and a prolonged recession (Huang et al., 2023).

One pressing issue facing the banking sector is the rise in non-performing loans (NPLs). A loan is classified as non-performing when the borrower has failed to make any scheduled payments or interest for over 90 days (Adriaan & Russel, 2005). This classification indicates an increased risk of default, and the accumulation of NPLs poses a significant threat to the stability of financial institutions. Recent studies have pointed out that the rise in NPLs not only affects the banking sector but also has broader implications for the economy as a whole (Zhang et al., 2022).

In the context of Morocco, there has been a notable increase in non-performing loans in recent years. According to Bank Al-Maghrib, Morocco's central bank, non-performing loans constituted more than 8% of the total credit volume in 2024. The presence of these loans can lead to stricter credit conditions, restricting access to financing for both businesses and consumers (Savon, 2025b). Such limitations can impede economic growth, as businesses may face challenges in investing and expanding operations, while consumers may struggle to secure financing for significant purchases.

Effectively managing non-performing loans is a complex task that necessitates a thorough understanding of the multiple factors contributing to a debtor's likelihood of default. According to existing economic literature, two primary categories of influences are identified as significant determinants of default risk. The first category encompasses the intrinsic characteristics of the debtor, including aspects such as credit history, income levels, and patterns of financial behavior. These factors can often be monitored and managed directly by lenders through careful assessment and intervention.

In contrast, the second category pertains to broader macroeconomic conditions that significantly impact the environment in which debtors operate. Variables such as inflation rates, unemployment levels, and measures of overall economic growth play a crucial role in shaping the financial stability of both households and non-financial corporations. Understanding these macroeconomic

factors is essential, yet they can be considerably more challenging to predict and manage, as they are influenced by a wide array of external elements beyond the control of individual lenders.

This study aims to provide a comprehensive analysis of how various macroeconomic factors affect non-performing loans (NPLs) differently across distinct loan categories within the Moroccan banking system. The relevance of this research can be understood from two significant perspectives. First, it addresses a significant issue that may have considerable implications for the stability and resilience of Morocco's financial sector. By gaining insight into the underlying causes of NPLs, stakeholders—including policymakers, financial institutions, and regulators—can develop more effective strategies to mitigate the risks associated with these loans, ultimately promoting economic stability. Second, to our knowledge, this research represents the first systematic examination of the macroeconomic determinants of non-performing loans categorized by debtor types in the Moroccan context. This differentiation is particularly vital, as various categories of borrowers—such as households and non-financial enterprises—are exposed to economic fluctuations and aggregate shocks in distinct ways. By highlighting these distinctions, the study seeks to clarify how financial health and repayment capacities vary across different debtor types and how macroeconomic conditions influence these dynamics.

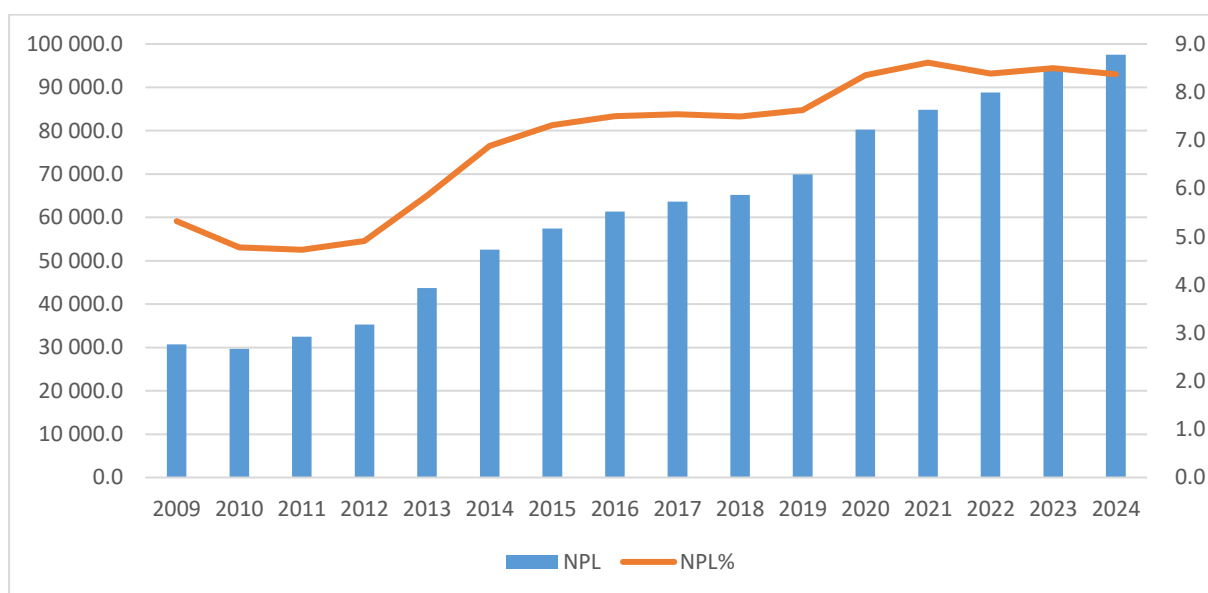
In this analysis, we utilize the Autoregressive Distributed Lag (ARDL) econometric approach, which is particularly well-suited for examining the relationship between macroeconomic variables and default risk over time. Our study spans from the first quarter of 2009 to the fourth quarter of 2024, providing a comprehensive understanding of the factors that have influenced credit risk in the Moroccan banking sector during this period. This in-depth exploration aims to offer valuable insights that can guide banking practices and regulatory policies, ultimately contributing to enhanced financial stability.

The structure of this article is organized as follows: the first section addresses non-performing loans within the Moroccan banking system. Section 2 reviews the existing research related to this topic. In Section 3, we outline the data, models, and methodology utilized in the study. Finally, Section 4 presents and interprets the findings.

1. Analysis of non-performing loans in the Moroccan banking system

Bank Al Maghrib reports that non-performing loans in Morocco exceeded 97 billion dirhams in 2024, accounting for 8.4% of the total credit volume. Figure N°1 indicates a concerning trend, as non-performing loans have risen both in total amount and as a percentage of overall credit between 2009 and 2024. The increase underscores potential challenges facing the banking sector, necessitating greater attention to risk management and the implementation of effective regulatory measures to address the growing problem of non-performing loans.

Figure N°1 : Evolution of the non-performing loans in Moroccan banking system



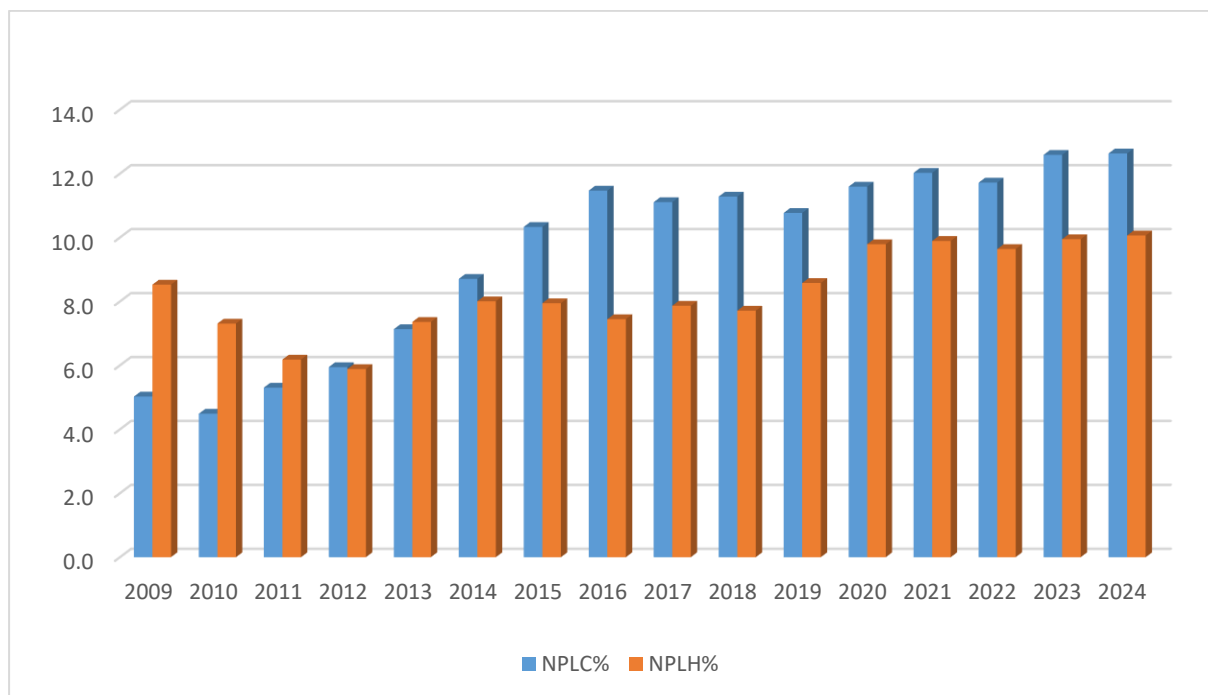
Source : Bank Al Maghrib

An examination of institutional sectors reveals significant trends in the rates of non-performing loans over time. Between 2009 and 2012, the rate of non-performing loans to households (NPLH%) declined, suggesting improvements in repayment rates or lending practices during that period (Figure N°2). However, following 2012, this rate began to rise, indicating potential challenges in the financial well-being of households or an increase in economic pressures faced by consumers. In contrast, the rate of non-performing loans to non-financial corporations (NPLC%) exhibited a steady upward trend from 2009 through 2024, reflecting ongoing difficulties in corporate borrowing and broader economic headwinds impacting businesses.

Notably, between 2009 and 2012, the rate of non-performing loans to households was higher than that to non-financial corporations. However, this trend reversed after 2012.

By 2024, the rate of non-performing loans to households reached 10%, while that to non-financial corporations rose to 12%. This convergence emphasises a significant shift in vulnerabilities among various economic agents. The varying patterns of non-performing loans to these sectors warrant further investigation to understand the underlying causes and implications for future economic stability.

Figure N°2 : Evolution of the NPL rate to households and non-financial firms within the Moroccan banking system: 2009-2024



Source : Bank Al Maghrib

2. Literature review

The relationship between the macroeconomic environment and credit quality is a widely studied topic within the realms of business cycles and banking stability. Researchers such as Fernandez de Lis et al. (2000), Salas and Saurina (2002), Fofack (2005), and Jimenez et al. (2006) have observed cyclical trends in the development of non-performing loans (NPLs).

While many studies have explored the relationship between economic fluctuations and the overall default risk faced by bank clients, a significant gap persists in understanding how these conditions specifically affect the solvency of different segments, including individuals and businesses. An extensive exploration of how factors such as inflation rates, unemployment levels, and interest rate variations influence repayment capacities and behaviors could provide valuable insights for policymakers and financial institutions alike.

2.1. Macroeconomic and monetary variables

2.1.1. Economic Growth Rate

Gross domestic product (GDP) growth is a critical macroeconomic indicator that significantly influences the quality of bank assets and receivables. During periods of recession or low economic growth, both businesses and households may face an increased likelihood of defaulting on their loans. This elevated risk primarily arises from a decline in the value of assets that serve as collateral

. Additionally, this economic downturn adversely impacts debtors' income, further undermining their ability to fulfill obligations to creditors, including banks.

The fruits of economic growth and prosperity are not uniformly distributed across society, resulting in significant disparities among various economic actors. While some individuals and businesses may experience substantial gains in wealth and opportunity, others might not benefit to the same extent, leading to unequal advantages. This uneven distribution can arise from factors such as access to resources, education, and market opportunities, which can disproportionately favor certain groups over others.

2.1.2. Interest Rates

Interest rates significantly influence the levels of non-performing loans, particularly for variable-rate debts. A positive correlation is typically assumed; as interest rates rise, outstanding debt increases, heightening the risk of debtor defaults and consequently raising NPLs. Conversely, lower interest rates can ease debt servicing costs, thereby reducing the likelihood of defaults. Nwankwo (1991) emphasizes that the nature of interest rate changes is crucial. Unpredictable fluctuations—whether increases or decreases—can negatively affect the quality of banks' loan portfolios, with unexpected increases posing more severe consequences due to their impact on asset values.

2.1.3. Inflation Rate

The "divine coincidence" hypothesis emphasizes that price stability is crucial for achieving financial stability and promoting sustainable economic growth. However, the literature on the relationship between inflation and credit risk remains ambiguous (Naili & Lahrichi, 2022). On one hand, high inflation can ease the burden of debt for borrowers by reducing the real value of their obligations. On the other hand, inflation can harm households with fixed incomes. Individuals reliant on fixed incomes, such as employees or recipients of fixed pension payments, see their purchasing power eroded as the prices of goods and services rise. Because their nominal incomes remain constant, the real value of their earnings declines in an inflationary environment. By contrast, economic agents with variable incomes, such as firms, whose earnings are linked to inflation adjustments, may find opportunities to increase their incomes during periods of inflation. Consequently, while fixed-income holders face significant challenges due to inflation, variable-income holders can adapt and potentially benefit from it.

2.1.4. Unemployment Rate

Unemployment is a significant macroeconomic factor that affects banks' credit risk. The unemployment rate represents the percentage of unemployed individuals relative to the total labor force. Studies indicate that an increase in the national unemployment rate is associated with a

deterioration in the quality of bank loans (Salas & Saurina, 2002). Elevated unemployment levels often lead to lower household incomes, which can impair individuals' ability to meet their loan obligations. Conversely, a decline in unemployment generally correlates with rising household income, thereby enhancing borrowers' capacity to repay loans. Additionally, the unemployment rate influences the non-performing loans of non-financial firms by impacting their revenues through fluctuations in demand (Louzis, Vouldis, & Metaxas, 2010).

2.1.5. Exchange Rate

The exchange rate is a critical factor in shaping a nation's external competitiveness, which in turn has a direct influence on the prevalence of non-performing loans (NPLs) within the economy. Fofack (2005) notes that in countries with fixed exchange rate regimes, a real appreciation of the currency can negatively impact the price competitiveness of exporting firms. This decline in competitiveness may impair their ability to repay debts, potentially leading to an increase in NPLs. On the other hand, currency depreciation is often regarded as a strategy to boost a country's competitiveness. Such an economic adjustment typically results in a rise in exports and a decline in imports (Tanasković & Jetrić, 2014). However, it is vital to consider the significant repercussions for domestic prices, particularly through the channel of imported inflation. As the value of the currency diminishes, the costs of imported goods tend to rise, which can lead to a general increase in domestic prices.

Additionally, it is important to acknowledge that if a substantial portion of loans is denominated in foreign currency, depreciation could have adverse effects on borrowers.

2.1.6. Money supply

The money supply is a crucial factor that significantly influences the level of non-performing loans within the financial system. An expansion of the money supply can stimulate higher investment and economic activity, often resulting in increased income levels for both individuals and businesses. As the money supply grows, borrowing costs typically decrease due to falling interest rates. This reduction in borrowing costs makes it easier for individuals and companies to secure loans. Consequently, borrowers are in a stronger position to manage their repayment obligations effectively and on time. When borrowers consistently meet their repayment commitments, the risk of defaults faced by banks is significantly reduced.

2.2. Empirical literature

The relationship between macroeconomic conditions and credit risk has been a notable area of study, with several key findings emerging over the years. Keeton and Morris (1987) were pioneers in this field, utilizing a sample of 2,500 banks in the American Midwest to demonstrate that macroeconomic variables significantly contribute to the presence of problematic loans. Following

this, Salas and Saurina (2002) investigated the Spanish banking sector from 1985 to 1997 and found that economic growth and interest rate spreads influence the ratio of problematic assets.

Johansson and Persson (2006) conducted simulations to assess the default risks that Swedish households face in the context of rising unemployment, increasing interest rates, and declining asset values. Their stress tests revealed that households are particularly vulnerable to interest rate hikes compared to fluctuations in unemployment. Interestingly, despite a hypothetical immediate increase in interest rates by 3 percentage points and significant declines in the value of real assets, the banking sector did not experience any credit losses that could jeopardize the stability of the financial system.

In a related study, Berge and Boye (2007) examined the influence of various factors—including real interest rates, oil prices, and domestic demand—on the occurrence of bad loans within the Swedish banking system. Their research indicated that elements such as unemployment, interest rates, economic growth, and real estate prices directly affect the prevalence of these loans. Expanding on this analysis, Nkusu (2011) utilized panel VAR techniques across advanced nations, uncovering a long-term relationship between macroeconomic performance and non-performing loans (NPLs). His findings suggest that low economic growth, high unemployment, and decreasing asset prices create vulnerabilities within the banking system, ultimately destabilizing the economy. Conversely, stronger economic growth tends to lower the ratios of non-performing loans. Furthermore, Louzis et al. (2012) examined the Greek banking system and found that both bank management quality and macroeconomic factors significantly impact credit risk across various loan categories, including consumer and business loans. Klein (2013) conducted a similar analysis for Central and Eastern European countries from 1998 to 2011 and identified that factors such as excessive loan issuance, unemployment, inflation, and currency exchange rates greatly influence the performance of banks' asset portfolios. He also highlighted a notable feedback effect where non-performing loans adversely impact macroeconomic performance.

Wdowiński (2014) explored these dynamics within the Polish banking sector from 1997 to 2013, identifying key macroeconomic variables, including GDP growth rate, interest rates, unemployment rates, and exchange rate fluctuations, as critical determinants of the non-performing loan ratio. Becket et al. (2015) provided a broader perspective by studying credit risk across 75 countries through panel data analysis, discovering that stock prices, economic growth, currency rates, and interest rates serve as explanatory variables for NPLs.

Anastasiou (2017) analyzed the Italian banking system from 1995 to early 2014 and found that rising non-performing loans were primarily due to adverse macroeconomic conditions and excessive credit expansion. The relationship was further supported by a Granger causality test.

Continuing this exploration, Anastasiou et al. (2019) focused on the euro area, investigating NPLs from 2003 to 2016 and assessing the differences between core and peripheral banking markets. Their findings revealed a significant upward trend in NPLs, particularly in peripheral regions, which they attributed to deteriorating macroeconomic conditions post-2008.

In a more recent study, Koju et al. (2020) reviewed non-performing loan data from 49 high-income countries between 2000 and 2015, correlating it with various macroeconomic indicators. Their results highlighted that GDP growth rate, GNI per capita growth rate, GDP per capita growth rate, and unemployment rate are significant influencers of credit risk trends, with per capita income demonstrating a particularly strong effect.

In emerging markets, Espinoza (2010) conducted a study on the Gulf Cooperation Council (GCC) countries, highlighting the negative impact of lower economic growth, higher interest rates, and increased twin deficits on NPLs rates. Notably, a strong short-term feedback effect was observed in these dynamics.

Similarly, Maarouf and Guellil (2017) analyzed the Algerian banking system from 1980 to 2014 and identified key determinants of NPLs, such as financial development, political stability, money supply, and GDP. Their findings reinforced the notion that these factors significantly influence NPLs rates in Algeria.

In Pakistan, a comprehensive study by Ahmed et al. (2021) examined the macroeconomic and bank-specific factors affecting NPLs in commercial banks between 2008 and 2018. Utilizing the dynamic Generalized Method of Moments (GMM) approach, the researchers found that higher interest rates, fluctuating currency rates, and political risks contributed to increased NPLs levels. Conversely, GDP growth emerged as a mitigating factor against the rise of NPLs.

In a study conducted by Kartal et al. (2021), the authors explored the connection between non-performing loans (NPLs) and economic growth (EG) in Turkey, analyzing quarterly data from the first quarter of 2005 to the fourth quarter of 2019. Utilizing a wavelet coherence approach, the researchers found that economic growth plays a significant role in explaining the trends observed in non-performing loans in Turkey.

Subedi (2023) explored the determinants of non-performing loans in Nepal, analyzing 11 years of data from 16 commercial banks. The study revealed that both inflation and lending interest rates have a positive, albeit minor, impact on NPLs, while GDP growth rate showed a negative influence, albeit marginal.

Mishra (2024) investigated the factors affecting non-performing assets in 45 Indian commercial banks over the fiscal years 2005-2006 to 2019-2020. The findings highlighted that lending rates

and credit expansion are crucial, as elevated lending rates can hinder borrowers' repayment abilities, leading to an increase in distressed assets.

A global perspective was provided by Salas et al. (2024), who examined the factors influencing non-performing loan ratios across banks worldwide. This extensive analysis included data from 1,631 entities across 111 countries, categorized into eight regions, and covered the period from 2007 to 2021. By applying panel data methods alongside a spectrum of specific and macroeconomic variables, the researchers identified key determinants of non-performing loan ratios, including bank size, profitability, unemployment rates, and interest and exchange rates.

A comparative analysis conducted by Syed et al. (2022) examined the impact of both bank-specific and macroeconomic determinants on nonperforming loans (NPL) in developed and developing countries. The study employed the dynamic Generalized Method of Moments (GMM) technique and spanned the period from 1995 to 2019, incorporating fixed and random effects tests to enhance the robustness of the findings. The results indicated that several common factors influence NPLs in both regions, including growth rate, inflation, interest rate, capital adequacy ratio, credit-to-deposit ratio, and bank credit to the private sector. Additionally, the analysis identified specific macroeconomic factors affecting developing countries, such as household consumption, unemployment, exchange rate, return on bank assets, the bank asset-to-GDP ratio, and bank credit to the government sector.

In another comparative analysis, Kjosevski et al. (2019) explored the determinants of non-performing loans (NPLs) among enterprises and households in the Republic of Macedonia. This study examined the entire banking sector from the fourth quarter of 2003 to the fourth quarter of 2014, utilizing the Autoregressive Distributed Lag (ARDL) Modelling Approach alongside a co-integration model with quarterly time series data. The findings revealed that the profitability of banks as well as the growth of loans to both enterprises and households exert a negative influence on NPLs levels. Conversely, factors such as bank solvency and unemployment exhibited a positive relationship with increasing non-performing loans across both sectors. Furthermore, the study found that the exchange rate positively and significantly affects NPLs levels for enterprises, while inflation has a negative and significant impact on the rise of non-performing loans among households.

Focusing on North African countries, Ouhibi et al. (2017) investigated systemic risks within the banking systems of Morocco and Tunisia through ordinary least squares (OLS) methodology. Their findings indicated that inflation, credit levels, gross capital formation, GDP, and unemployment rates significantly contribute to NPLs in Tunisia. In contrast, only GDP and exchange rates were identified as influencing factors in Morocco.

Recently, Savon (2025a) analyzed the macroeconomic conditions influencing credit risk within the Moroccan banking sector from the first quarter of 2009 to the first quarter of 2020. Utilizing the Autoregressive Distributed Lag (ARDL) method and conducting the Toda-Yamamoto causality test, this study revealed that real GDP, inflation, and exchange rates negatively impact NPLs in the short term. In the long term, rising unemployment rates and currency depreciation correlate with increased credit risk. Furthermore, findings from the Toda-Yamamoto test highlighted the significant effects of interest rate, unemployment, and exchange rate on non-performing loan ratios, reinforcing the relationship between financial stability and broader economic conditions.

3. Data, methodology and models

3.1. Data

This study utilizes secondary data obtained from the official websites of Bank Al Maghrib and the High Commission for Planning (HCP). The dataset encompasses quarterly information covering the period from 2009 to 2024. Our analysis focuses on two dependent variables: the rates of non-performing loans for households and for non-financial firms. We include key macroeconomic indicators as explanatory variables, selected based on insights from an extensive literature review. All variables in the analysis have been converted to their natural logarithmic form. A detailed summary of the variables employed in this study is provided in Table N°1. All variables have been transformed into their natural logarithmic form to address non-normality and minimize heteroscedasticity within the data series (Abulibdeh, 2022; Adelodun et al., 2023; Rodriguez-Espinosa et al., 2025). The descriptive statistics for the variables are summarized in Table N°2.

Table N°1 :Summary of the variables

Variable nature	Variable	Acronym	Source
Dependent variables	The percentage of non-performing loans to non-financial firms relative to total loans to non-financial firms	LnNPLC	Bank Al Maghrib
	The percentage of non-performing loans to households relative to total loans to households	LnNPLH	

Independent variables	The real Gross Domestic Product	LnRGDP	High Commission for Planning
	The unemployment rate	LnUNEMP	High Commission for Planning
	The consumer price index	LnCPI	High Commission for Planning
	The interest rate	LnINTER	Bank Al Maghrib
	The exchange rate of the euro relative to the Moroccan Dirham	LnEXCH	Bank Al Maghrib
	Monetary aggregate : M2	LnM2	Bank Al Maghrib

Source : The author

Table N°2 : Descriptive statistics

	LnNPFH	LnNPF	LnRGDP	LnUNEMP	LnCPI	LnEXCH	LnINTER	LnM2
Mean	2.242425	2.188281	26.20355	2.323412	4.777616	2.394989	1.697643	27.54794
Median	2.244918	2.383155	26.21179	2.277254	4.768563	2.394708	1.696522	27.52508
Maximum	2.455540	2.562563	26.52291	2.617396	4.949655	2.428601	1.894617	28.09442
Minimum	1.940465	1.501741	25.87459	2.079442	4.659658	2.347558	1.444563	27.04965
Std. Dev.	0.137692	0.341715	0.182959	0.152870	0.079859	0.020768	0.134289	0.297075
Skewness	-0.430952	-0.680561	0.019675	0.486334	0.841268	-0.343302	-0.355127	0.183809
Kurtosis	2.330326	1.823707	1.848954	2.024851	2.810988	2.221938	2.009171	1.878284
Observations	64	64	64	64	64	64	64	64

Source : The author

3.2. Methodology

This research aims to conduct a comprehensive empirical analysis of the impact of macroeconomic conditions on non-performing loans on households and non-financial firms in Morocco. To achieve this objective, we will employ the Autoregressive Distributed Lag- Error Correction Model (ARDL-ECM) approach. Developed by Pesaran, Shin, and Smith in 1999, this approach is particularly advantageous for analyzing relationships among variables that display integration and diverse time dynamics. This method enables the simultaneous estimation of short-run fluctuations alongside long-run equilibrium, rendering it a highly versatile tool in econometrics.

Prior to conducting model estimation, it is imperative to ensure that the variables do not have an order of integration of I(2) or higher. This step is vital for applying a bounds-testing approach effectively and avoiding spurious results, as emphasized by Pesaran et al. (2001). To assess this condition, the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979) and the Phillips-Perron (PP) test (Phillips & Perron, 1988) are utilized to evaluate the stationarity of the variables. After evaluating the stationarity of our time series data, we will proceed to investigate the concept of cointegration among these series. Cointegration analysis is essential for identifying potential long-term equilibrium relationships that may exist between nonstationary time series. If we find evidence of cointegration, it suggests that, despite being individually nonstationary, the series tend to move together over time. Following the establishment of cointegration, we will then calculate the coefficients that characterize both the short-term and long-term dynamics of the relationships among the variables.

3.3. Models

The empirical models are carefully designed to incorporate insights from both the relevant theoretical and empirical literature. They are articulated as follows:

$\text{LnNPLF} = f(\text{LnRGDP}, \text{LnUNEMP}, \text{LnINTER}, \text{LnCPI}, \text{LnEXCH}, \text{LnM2})$.

$\text{LnNPLH} = f(\text{LnRGDP}, \text{LnUNEMP}, \text{LnINTER}, \text{LnCPI}, \text{LnEXCH}, \text{LnM2})$.

The ARDL model can be articulated in the following forms:

$$\begin{aligned} \Delta \text{LnNPLF}_t = & a_0 + \sum_{i=0}^M a_{1i} \Delta \text{LnNPLF}_{t-i} + \sum_{i=0}^N a_{2i} \Delta \text{LnRGDP}_{t-i} \\ & + \sum_{i=0}^O a_{3i} \Delta \text{LnUNEMP}_{t-i} + \sum_{i=0}^P a_{4i} \Delta \text{LnINTER}_{t-i} + \sum_{i=0}^Q a_{5i} \Delta \text{LnEXCH}_{t-i} \\ & + \sum_{i=0}^R a_{6i} \Delta \text{LnCPI}_{t-i} + \sum_{i=0}^S a_{7i} \Delta \text{LnM2}_{t-i} + b_1 \text{LnRGDP}_{t-1} \\ & + b_2 \text{UNEMP}_{t-1} + b_3 \text{LnINTER}_{t-1} + b_4 \text{LnEXCH}_{t-1} + b_5 \text{LnCPI}_{t-1} \\ & + b_6 \text{LnM2}_{t-1} + e_t \end{aligned}$$

$$\begin{aligned}\Delta \text{LnNPLH}_t = & c_0 + \sum_{i=0}^T c_{1i} \Delta \text{LnNPLH}_{t-i} + \sum_{i=0}^U c_{2i} \Delta \text{LnRGDP}_{t-i} + \sum_{i=0}^V c_{3i} \Delta \text{LnUNEMP}_{t-i} \\ & + \sum_{i=0}^W c_{4i} \Delta \text{LnINTER}_{t-i} + \sum_{i=0}^X c_{5i} \Delta \text{LnEXCH}_{t-i} + \sum_{i=0}^Y c_{6i} \Delta \text{LnCPI}_{t-i} \\ & + \sum_{i=0}^Z c_{7i} \Delta \text{LnM2}_{t-i} + d_1 \text{LnRGDP}_{t-1} + d_2 \text{LnUNEMP}_{t-1} \\ & + d_3 \text{LnINTER}_{t-1} + d_4 \text{LnEXCH}_{t-1} + d_5 \text{LnCPI}_{t-1} + d_6 \text{LnM2}_{t-1} + \theta_t\end{aligned}$$

Where Δ is the first difference operator; a_0, c_0 are the constant terms; $M \dots S, T \dots Z$ are lag lengths; $a_1 \dots a_7, c_1 \dots c_7$, are the short-run correlation coefficients; $b_1 \dots b_6, \dots$, are long-run correlation coefficients; e_t, θ_t are the stochastic error terms.

4. Results and discussion

This study seeks to empirically examine the impact of macroeconomic conditions on non-performing loans on households and non-financial firms in Morocco. We use the ARDL-ECM approach. It is appropriate to the situation where there is integration and allows for simultaneous estimation of short-run dynamics and long-run equilibrium.

4.1. Unit root tests

Table N°3 offers a detailed examination of the unit root test results for the series at both their original levels and first differences. The findings from the Augmented Dickey-Fuller (ADF) test, in conjunction with the Phillips-Perron (PP) test, reveal that all series analyzed are integrated of order 1. This indicates that first differencing is necessary for the series to achieve stationarity.

Table N°3 : Unit root tests

Variables	Augmented Dickey-Fuller (ADF)	Philips-Perron (PP)	Order of Integration (I)
	Level	First difference (Δ)	
LnNPLF	-1.2253	-2.8057*	I(1)
LnNPFH	-1.3219	-5.8055***	I(1)
LnRGDP	-0.4888	-9.7270***	I(1)
LnCPI	0.6893	-3.8408***	I(1)
LnUNEMP	-2.2765	-8.4450***	I(1)
LnEXCH	-0.8481	-16.7433***	I(1)

LnINTER	-1.4775	-7.3105***	-1.4855	-7.2889***	I(1)
LnM2	2.0355	-3.0850**	1.4860	-14.5648***	I(1)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source : The author

4.2. Cointegration test

The analysis presented in Table N°4 indicates that the F-statistic value for both models exceeds the upper bound threshold at a 1% significance level. This result provides strong evidence for the presence of cointegration among the variables being examined, suggesting a long-term equilibrium relationship among them. The identification of cointegration signifies that, despite possible short-term fluctuations, the non-performing loan (NPL) rates across different debtor categories are inherently linked to the explanatory factors over the long run.

This finding paves the way for a more thorough exploration of both the long-term trends and short-term dynamics that shape NPLs rates. By acknowledging the cointegration, researchers can investigate how various categories of debtors interact with other economic indicators and how these relationships may evolve over time. Understanding these connections is essential for developing effective strategies and policies aimed at managing NPLs and addressing the underlying factors that influence their rates among distinct debtor categories.

Table N°4 : Cointegration test

	F-statistic	Value	Signif.	I(0)	I(1)
Model of LnNPLC	4.225502	6	10%	1.99	2.94
Model of LnNPLH	5.419123	6	5%	2.27	3.28
		6	1%	2.88	3.99

Source : The author

4.3. Long term effects estimation

Table N°5 presents the long-term coefficients derived from the analysis of the two models, focusing on the external drivers of non-performing loan (NPL) rates for households and non-financial firms.

The findings underscore a lack of long-term systemic impact on the NPLs rate associated with households. Instead, the fluctuations in these rates appear to be more closely linked to idiosyncratic risk factors, which are unique to individual borrowers, and may include personal financial circumstances and behavioral aspects. This distinction helps elucidate the default risk encountered by household debtors.

In contrast, the analysis indicates that NPLs rate for non-financial firms is significantly influenced by various macroeconomic and monetary conditions. Notably, extended periods of economic prosperity can paradoxically lead to an increase in non-performing loans. This phenomenon occurs because, during times of economic euphoria, banks often become overly optimistic and underestimate the inherent risks associated with heightened loan demand. This tendency aligns with theoretical frameworks such as Hyman Minsky's instability theory, which describes how financial markets can become excessively speculative during booms, and Ben Bernanke's accelerator theory, which illustrates how shifts in economic activity can amplify borrowing behaviors.

Conversely, sustained inflation contributes to financial instability evidenced by rising non-performing loans. Continuous price increases erode the purchasing power of consumers and businesses, ultimately hindering economic activity and impacting the solvency of non-financial firms.

Interestingly, the depreciation of the dirham appears to have a beneficial effect on firm solvency. This currency devaluation enhances the competitiveness of exports and stimulates tourism, ultimately aiding in the reduction of NPLs rate by improving the financial health of these companies. In this context, the relationship between currency stability, export performance, and firm solvency highlights the intricate dynamics of macroeconomic forces at play in influencing lending practices and financial outcomes.

The presence of a negative sign associated with the M2 coefficient, along with its significance, suggests that monetary expansion has the potential to improve the financial health of non-financial firms. This improvement may help alleviate their solvency challenges, thereby enhancing their ability to meet obligations and sustain operations. Furthermore, by facilitating better asset quality within banks, this monetary expansion can contribute to overall banking stability. In essence, an increase in the money supply could lead to a more favorable economic environment for these firms, ultimately supporting the robustness of the banking sector.

The analysis reveals some intriguing insights, particularly regarding the coefficients associated with interest rates and unemployment. A key finding is that these coefficients are statistically insignificant, indicating a disconnection between interest rates and unemployment on one hand, and the financial challenges faced by non-financial corporations in terms of loan repayments on the other.

Throughout the examined period, the observed interest rate levels do not sufficiently account for the payment difficulties encountered by non-financial firms in their dealings with banks. This

suggests that fluctuations in interest rates have minimal impact on these companies' abilities to meet their financial obligations.

Moreover, the analysis indicates that the unemployment rate also appears to have no significant effect on the financial health of non-financial firms. This implies that variations in unemployment levels do not significantly obstruct these firms' capacity to repay loans to banks.

Table N°5 : Long term effects estimation

Dependent variable	LnNPLF		LnNPLH	
Independent variables	Coefficient	Prob.	Coefficient	Prob.
LnRGDP	15.55141***	0.0000	7.085644	0.5802
LnCPI	3.150782**	0.0292	41.16774	0.5078
LnUNEMP	-0.415430	0.1034	-1.414118	0.8150
LnEXCH	8.924940***	0.0013	66.52817	0.5377
LnINTER	0.119939	0.8129	-15.47167	0.4959
LnM2	-8.872370***	0.0000	-19.55689	0.4948
C	-197.1253***	0.0000	23.33951	0.8393

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source : The author

4.4. Short term effects estimation

Table N°6 presents the short-term coefficients from two models analyzing the external drivers of non-performing loans rates to households and non-financial corporations. The examination of macroeconomic and monetary factors highlights their immediate impact on the solvency of these sectors. A key observation is the persistence of the dependent variables, demonstrated by the significant coefficients associated with their lagged values. This suggests that previous non-performing loan (NPL) rates are critical in influencing current rates, underlining the importance of historical data in understanding trends in loan performance.

Inflation has been identified as a significant variable that exerts a positive and delayed impact on NPLs rates for both households and corporations, with a more pronounced effect observed among households. This suggests that rising inflation tends to elevate NPLs rate of households more sharply than of non-financial corporations, likely due to households facing relatively lower financial resilience and a heightened vulnerability to increasing prices.

Unemployment also significantly influences NPL rates, showing a positive correlation for both households and corporations. However, the impact of unemployment appears to be more severe

for non-financial firms, indicating that job losses or reduced employment levels present greater challenges to the financial stability of corporations compared to individual households.

An intriguing aspect of the analysis pertains to currency depreciation, which yields contrasting outcomes for these two groups. For non-financial corporations, currency depreciation seems to enhance financial health, potentially by improving competitiveness in export markets. In contrast, the impact on households is adverse, as indicated by a positive coefficient for the exchange rate, signaling deteriorating financial conditions. Furthermore, the effect of exchange rate fluctuations tends to diminish over time, suggesting that the initial adjustments are more pronounced immediately following such changes. On average, the effects on non-financial corporations are greater than those observed for households, highlighting the complex relationship between currency movements and the financial well-being of different economic actors.

In the short term, interest rates exhibit a significant negative correlation with NPLs rate. Higher interest rates typically suppress long-term financing opportunities, leading households and non-financial firms to be less inclined to seek loans. As borrowing costs rise, banks often respond by tightening their credit standards, resulting in more selective approval of loan applications. This increased scrutiny can temporarily lower the incidence of non-performing loans or defaults, thereby creating a cycle where rising interest rates induce borrowers to be more cautious, while lenders become increasingly risk-averse, ultimately contributing to a reduction in non-performing loans within the financial system.

The money supply also plays a significant role in influencing NPLs rate, although its effects differ between non-financial firms and households. An increase in the money supply generally correlates with a rise in NPLs rates for non-financial firms, indicating that greater liquidity in the economy may lead to higher repayment difficulties for these companies. Conversely, for households, an increase in the money supply typically reduces NPLs rate, suggesting that improved access to funds enhances individual borrowers' capacity to meet their financial obligations. In summary, while an expansion of the money supply may elevate NPLs rate for non-financial firms, it concurrently reduces those rates for households.

Additionally, the error correction term ($ECM(-1)$) in each model is negative and statistically significant, confirming the presence of a stable long-term equilibrium among the examined variables. This finding indicates that any short-term deviations from this equilibrium are expected to be corrected over time.

Table N°6 : Short term effects estimation

Dependent variable : LnNPLNFC		Dependent variable : LnNPLH	
Independent variables	Coeffi.	Independent variables	Coeffi.
D(LnNPFNC_(-1))	0.861***	D(LnNPLH(-1))	-0.552043***
D(LnNPFNC_(-2))	-0.390***	D(LnNPLH(-2))	-0.901380***
D(LnNPFNC_(-3))	0.565***	D(LnRGDP)	-1.913048***
D(LnNPFNC_(-4))	-0.267***	D(LnRGDP(-1))	-1.690726***
D(LnRGDP)	2.012***	D(LnRGDP(-2))	-2.450391***
D(LnRGDP(-1))	-6.501***	D(LnRGDP(-3))	-1.770457***
D(LnRGDP(-2))	-3.894***	D(LnRGDP(-4))	-0.321025
D(LnRGDP(-3))	-1.010**	D(LnRGDP(-5))	0.763255**
D(LnRGDP(-4))	-1.011**	D(LnCPI)	-4.301719***
D(LnCPI)	-0.405	D(LnCPI(-1))	-0.817199
D(LnCPI(-1))	0.834	D(LnCPI(-2))	-0.638520
D(LnCPI(-2))	1.208*	D(LnCPI(-3))	3.117335***
D(LnCPI(-3))	1.077	D(LnCPI(-4))	5.131315***
D(LnCPI(-4))	1.939***	D(LnCPI(-5))	2.553936***
D(LnCPI(-5))	-2.186***	D(LnUNEMP)	0.084564
D(LnUNEMP)	0.342**	D(LnUNEMP(-1))	0.056219
D(LnUNEMP(-1))	1.434***	D(LnUNEMP(-2))	0.059636
D(LnUNEMP(-2))	1.482***	D(LnUNEMP(-3))	0.595424***
D(LnUNEMP(-3))	1.462***	D(LnUNEMP(-4))	0.653465***
D(LnUNEMP(-4))	0.578***	D(LnUNEMP(-5))	0.451342***
D(LnEXCH)	-0.513	D(LnEXCH)	0.310565
D(LnEXCH(-1))	-8.193***	D(LnEXCH(-1))	5.134489***
D(LnEXCH(-2))	-6.539***	D(LnEXCH(-2))	4.437368***
D(LnEXCH(-3))	-6.914***	D(LnEXCH(-3))	2.723182***
D(LnEXCH(-4))	-3.927***	D(LnEXCH(-4))	0.861848**
D(LnEXCH(-5))	-3.188***	D(LnINTEREST)	0.445875**
D(LnINTEREST)	0.209	D(LnINTEREST(-1))	-0.751596***
D(LnINTEREST(-1))	-1.268***	D(LnINTEREST(-2))	-0.445247**
D(LnINTEREST(-2))	-0.537***	D(LnINTEREST(-3))	-0.689172***

D(LnINTEREST(-3))	-1.255***	D(LnINTEREST(-4))	-0.585612***
D(LnINTEREST(-4))	-0.223***	D(LnINTEREST(-5))	-0.814634***
D(LnINTEREST(-5))	-0.598***	D(LnM2)	-3.916003***
D(LnM2)	-1.770***	D(LnM2(-1))	-6.124694***
D(LnM2(-1))	7.181***	D(LnM2(-2))	-6.572104***
D(LnM2(-2))	6.873***	D(LnM2(-3))	-5.211108***
D(LnM2(-3))	6.587***	D(LnM2(-4))	-2.847595***
D(LnM2(-4))	4.310***	CointEq(-1)*	0.078363***
D(LnM2(-5))	4.582***		
CointEq(-1)	-0.752***		
R-squared	0.945852	R-squared	0.887766
Adjusted R-squared	0.837557	Adjusted R-squared	0.695364

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source : The author

4.5. Diagnostic tests

The results , which outline the diagnostic tests used to evaluate the reliability and robustness of the two models, are summarized in Table N°7. The findings indicate that the residuals follow a normal distribution and do not show signs of autocorrelation or heteroskedasticity. Additionally, the stability of the parameters in both models is confirmed by the CUSUM test, further emphasizing their reliability.

The results of the diagnostic tests aimed at evaluating the reliability and robustness of the two models are meticulously summarized in Table 6. These findings indicate that the residuals from both models follow a normal distribution, which suggests compliance with the assumptions of classical regression analysis. Furthermore, the evaluation showed no signs of autocorrelation, indicating that the residuals are not influenced by their past values, thereby reinforcing the models' validity over time. Additionally, heteroskedasticity, which refers to the variability of the residuals being non-constant, was assessed and found to be absent in either model.

Moreover, the stability of the estimated parameters was verified through the Cumulative Sum Control Chart (CUSUM) test. The results confirmed that the parameters of both models remain stable, providing robust evidence of their reliability and consistency across various conditions. Collectively, these diagnostic evaluations highlight the models' robustness, making them well-suited for further application and analysis.

Table N°7: Diagnostic tests

Diagnostic Test	Test type	Model of the NPL rate for the non-financial corporates		Model of the NPL rate for the households	
		Statistic	Prob.	F-statistic	Prob.
Serial Correlation	Breusch- Godfrey LM	1.229197	0.3332	0.652869	0.5381
Homoskedasticity	Breusch-Pagan- Godfrey	1.589831	0.1938	1.995516	0.0805
Normality	Jarque-Bera	0.992566	0.608789	0.646342	0.72385
Stability	CUSUM	Yes		Yes	

Source : The author

Conclusion

The banking system is a cornerstone of the economy, facilitating the mobilization of savings and the allocation of funds. One significant concern within this domain is the increasing prevalence of non-performing loans, which pose considerable risks to financial stability. In Morocco, NPLs rose to over 8% of total credit in 2024, leading to restricted access to financing and impeding economic growth.

This study examines how macroeconomic factors affect NPLs across loan categories in Morocco. Utilizing the Autoregressive Distributed Lag (ARDL) approach, the analysis covers the period from 2009 to 2024.

The findings present a divergence in the long-term dynamics of non-performing loans rates between households and non-financial firms. For households, there is a lack of long-term systemic impact on the NPLs rate associated with households. Instead, the fluctuations in these rates appear to be more closely linked to idiosyncratic risk factors. Instead, NPLs rate exhibits fluctuations primarily influenced by individual borrower-specific risk factors. Conversely, NPLs rate for non-financial firms are substantially affected by macroeconomic conditions. Notably, prolonged periods of economic growth can paradoxically lead to increased NPLs, as financial institutions may adopt an overly optimistic outlook regarding risks associated with heightened loan demand. Additionally, sustained inflation adversely impacts the purchasing power of both consumers and businesses, thereby influencing the solvency of non-financial firms. In contrast, the depreciation of the dirham appears to enhance the solvency of these firms by improving their export competitiveness, which ultimately contributes to the reduction of NPLs rate.

The assessment of monetary dynamics reveals a negative correlation with the M2 coefficient, suggesting that monetary expansion may support the financial health of non-financial firms. This improvement can alleviate solvency challenges and promote overall banking stability. However, the coefficients associated with interest rates and unemployment are statistically insignificant, indicating a disconnect from the financial challenges faced by non-financial corporations in relation to loan repayments.

In the short term, inflation has been identified as a significant factor positively impacting NPLs rates for both households and corporations, with a more pronounced effect observed among households, likely due to their relative financial vulnerability. Unemployment also demonstrates a significant influence on NPLs rate in the short term, presenting notable challenges for non-financial firms.

Furthermore, while currency depreciation improves the financial condition of non-financial corporations, it adversely affects households. The impact of exchange rate fluctuations appears to diminish over time, indicating that initial adjustments are more pronounced in the immediate term. The relationship between interest rates and NPL rates is notably negative in the short term, as higher interest rates discourage borrowing and result in more selective loan approvals, leading to a temporary decline in defaults. Lastly, the influence of the money supply on NPL rates differs markedly between firms and households. An increase in the money supply tends to elevate the NPL rate for non-financial firms. Still, it reduces it for households, as greater access to funds enables individuals to meet their financial obligations.

These findings, although limited by a relatively brief time frame and a focus on key macroeconomic variables, support the idea that banking and financial turbulence signal economic instability. Financial institutions must consider economic conditions and their differential impacts on households and non-financial firms when assessing asset quality to effectively manage risk exposure. Furthermore, policymakers should consider the varying effects of macroeconomic conditions on the financial positions of institutional sectors when designing macroprudential policy.

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