Bank non-performing loans research around the world

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Abstract

This article presents a literature review of the post-2020 bank non-performing loans (NPLs) research around the world and suggests directions for future research. Using the thematic and bibliometric literature review methodologies, we find that significant NPL research has emerged from the European, Asian, and African regions while fewer research has emerged from the Asia-Pacific, North America, Latin America and Caribbean regions as well as from SAARC and OECD countries. The new NPL determinants in the recent literature are corporate governance, fintech, financial inclusion, country risks, regulatory quality, political risks, shadow banking activity, the COVID-19 pandemic, public/external debt, country risks, real house prices, and the independence of the central bank. The common regional NPL determinants are corruption, GDP, debt, loan growth, inflation, capital adequacy ratio, lending rate, competition, the regulatory environment, and GDP growth. The common theories used in the recent literature to explain the behavior of NPL are agency theory, stakeholder theory, information asymmetry theory, and moral hazard theory while the common empirical methodologies used are the panel regression and system GMM regression methods. The implication is that financial regulators, bank supervisors and banking scholars should pay attention to the new emerging determinants of NPL. They should also understand the effect of NPL on financial/banking stability so that safeguards can be put in place to minimise the adverse effect of non-performing loans. More research is needed to provide insights into this area.

Keywords: Banks, NPL, non-performing loans, research, determinants, literature review, world.

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1. Introduction

Bank non-performing loan (NPL) is a topic of great importance in the banking and finance literature. A non-performing loan is a loan in which the borrower has defaulted in making repayment of the principal and interest for a period of time usually 90 or 180 days (Farnè and Vouldis, 2024). Non-performing loans are mostly associated with banks which are deposit taking and lending institutions. Banks issue loans to credit worthy borrowers and expect borrowers to make repayment of the loan principal and interest at a specific period (Tölö and Virén, 2021). Borrowers may default on loan repayment. When they do, the loan becomes non-performing.

Bank NPL continues to attract the attention of bank managers, academics, economists, bank supervisors and financial regulators for seven reasons. One, a high level of NPL in the banking sector reduces the ability of banks to provide credit to the real economy to stimulate production and consumption towards economic growth. Two, NPL is procyclical with changing economic conditions. This means that NPL tends to be higher during economic downturns and lower during good economic times as was observed during the 2007-2009 global financial crisis and the COVID-19 pandemic (Ari et al, 2020; Alnabulsi et al, 2022). Three, NPL is important because minimising the level of NPL is a central objective of banking supervision. Fewer NPL means greater bank stability and low risk of a financial/banking crisis. Four, NPL has a signalling power because it can signal to investors and depositors that a bank has poor management quality. It can also signal poor regulation and supervision of banks by financial regulators and bank supervisors.

Five, banks with a large loan portfolio are exposed to loan default or credit risk when unfavourable economic conditions and unforeseen changes in borrowers' characteristics make it difficult for borrowers to repay the loan owed to banks and other lending institutions (Serrano, 2021). Six, large NPL on bank income statement will decrease bank profit, erode bank capital, and make banks become financially unstable. Seven, bank NPL is also important to bank regulators and supervisors for financial stability reasons. Bank regulators usually determine the regulatory threshold for banking sector NPL (Kanoujiya et al, 2023). In many countries, bank regulators keep the NPL threshold at a single-digit percent level. After determining the threshold, bank regulators strive to use macroprudential and micro prudential regulatory tools to influence banks to meet the regulatory NPL target (Suárez and Sánchez Serrano, 2018). Despite attempts by regulators and supervisors to control NPL, NPL is not easy to control and may become erratic due to loan recovery problems and the many unforeseen external factors that affect borrowers' ability to repay loans as at when due (Bellotti et al, 2021; Foglia, 2022).

These issues have made bank NPLs the focus of some heated debates in the banking regulation literature, and it reinforce the need to revisit the determinants of NPL and its consequences on financial institutions and the economy. Notably, there is growing demand

by economists and policymakers for insightful research into the non-traditional determinants of NPL and the likely effect of NPL on banks and the economy in recent times. The demand for such research has never been higher than it is right now, especially now that policymakers are concerned about the potential effect of geopolitical tensions, rising inflation and tariff trade wars on bank NPLs. Valuable insight into the recent determinants of NPL and its effects can be gained from a comprehensive review of the recent NPL research in the literature. Presently, no study has presented an overview or a literature review of the post-2020 studies. Existing studies have not examined the recent non-traditional determinants of NPL or its effect on the economy. Having identified these gaps, this study presents a comprehensive review of the recent research into bank non-performing loans from different regions of the world to identify the non-traditional determinants of NPLs and the effect of NPL on banks and the economy. It also suggests some directions for further research.

Before proceeding, I commend Manz (2019) and Chawla and Rani (2021)'s literature review that presented an overview of the determinants of NPL in the pre-2020 period. The present review complements the work of Manz (2019) and Chawla and Rani (2021) by identifying the recent determinants of NPL. However, the present review is significantly different from early literature review studies in several ways. One, the present review captures new developments in NPL research which are not documented in early literature review studies. Two, the present study provides a bibliometric analysis of the recent developments in the NPL literature. Such analysis was not provided in prior literature review studies. Three, the present review breaks down the recent NPL research according to regions, regional blocs, country-specific and cross-country studies in order to provide a good understanding of the regional developments in NPL research, and to make it easier to identify the gaps in the literature that needs to be filled by future research studies. Such break down was not provided in prior literature review studies. Therefore, there is a need to present a comprehensive overview of the recent research in the NPL literature and to identify the new developments (i.e., new determinants and effects) that need to be singled out and brought to the attention of scholars and policymakers to stimulate further research inquiry that would expand the scope of NPL research and offer some directions for future research.

The analysis in this review article contributes to the NPL literature in several ways. One, it contributes to existing literature review studies that present an overview of the determinants of bank NPL (e.g., Manz, 2019; Chawla and Rani, 2021), but which have not provided an overview of the non-traditional determinants of NPL in the recent literature since 2020. Two, the study contributes to the literature by using a bibliometric analysis to show academics and researchers the areas where more collaborative research is needed to advance the literature. Three, the study contributes to the NPL literature that examines the institutional factors affecting bank NPL (Hakimi et al, 2022; Giammanco et al, 2023; Ahiase et al, 2024). Four, it contributes to emerging studies that examine the adverse effects of NPL for bank performance, stability, and economic growth (Huljak et al, 2022; Duong et al, 2023; Sain and Kashiramka, 2023). Insights from this article can provide a better understanding of how NPL

affects banks and the economy. Finally, the discussion in this review article can assist regulators and supervisors in identifying the macro 'economic' and 'non-economic' factors that exert some influence on bank NPL which they have not taken into consideration in their stress test activities.

The rest of the study is organised as follows. Section 2 presents the methodology used to conduct the review. Section 3 presents the bibliometric analysis of the developments in NPL research. Section 4 presents the thematic review of the recent NPL literature. Section 5 presents the recent NPL research around the world. Section 6 presents the methodological advances and issues in NPL research. Section 7 suggests some areas for future research. Section 8 presents the conclusion of the study.

2. Methodology

The study used the thematic and bibliometric literature review methodologies to conduct the review. A thematic review method is used to capture the major research areas, themes or issues in the NPL literature. A reproducible search strategy, inclusion criteria and screening method are used to obtain the articles included in the thematic literature review. The first criterion is the article search instrument. The study used Google Scholar as the main article search instrument because it is considered to be the world's largest search engine that indexes the full text or metadata of scholarly research across many disciplines. Google Scholar is less restrictive compared to Scopus and Web of Science. More articles were obtained from Google Scholar compared to Scopus and Web of Science. Google Scholar is more inclusive because it allows the user to access and review articles which are not indexed in the Web of Science and Scopus. Google Scholar also makes it easier to find relevant articles that are not indexed by other search platforms. The second criterion is the sample period. The sample period for the review is from 2020 to mid-2024. This ensures that the study captures the relevant research the NPL literature in the last five years. The third criterion is language. Only the articles published in English language were used for the review. The fourth criterion is the article search and selection process. The articles were selected by inserting the keyword "non-performing loan'' into Google Scholar search engine. This approach is important because it ensures that only the articles that focus on non-performing loans in the literature are selected. The resulting articles from Google Scholar search were used to conduct the literature review. 372 articles were found from Google Scholar search results. The 372 articles were used to conduct the bibliometric analysis in section 3. However, to conduct the thematic literature review in sections 4 & 5, the 372 articles were further screened for quality of the research, type of journal, article duplication, and non-relevance to NPL. This process reduced the articles to 96 articles which include peer-reviewed journal articles and few working papers.

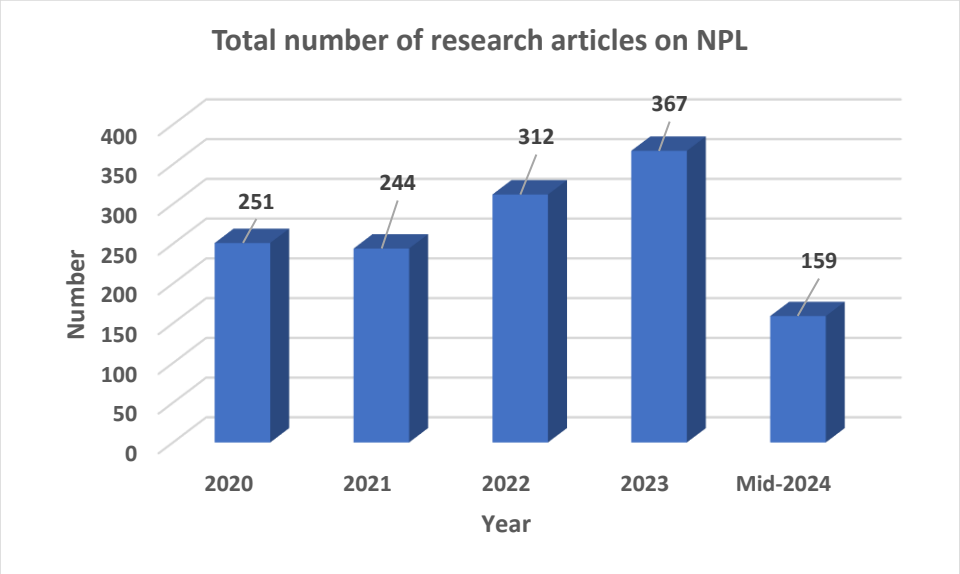
3. A bibliometric analysis of the developments in NPL research

This section presents a bibliometric analysis of NPL research in the recent literature. The bibliometric analysis aims to provide a visualization of the developments in the recent NPL literature and to understand the publication relationships. In this section, the stringent article selection criteria in section 2 are relaxed in order to obtain a large number of articles for the bibliometric analysis.

3.1. Total number of articles and the regional focus of regional NPL studies

The total number of articles found in Google Scholar increased each year from 2020 to mid-2024 (see figure 1). It is also important to identify the geographical focus of recent NPL studies. Observation from Google Scholar search results – from the first page to the fifteenth page of the search results – show that regional NPL studies focus mostly on the European region, followed by the African region, and the Asian region (see table 1). Regarding the NPL research focusing on the regional blocs, it can be observed that some studies examine NPL in MENA, BRICS, ASEAN and GCC countries while only few NPL studies focus on the SAARC and OECD countries. This finding indicates that more NPL research is needed for SAARC and OECD countries and for the Asia-Pacific, North America, Latin America and Caribbean regions.

Figure 1. Total number of research articles on NPL



Source: Google Scholar (2020 to mid-2024)

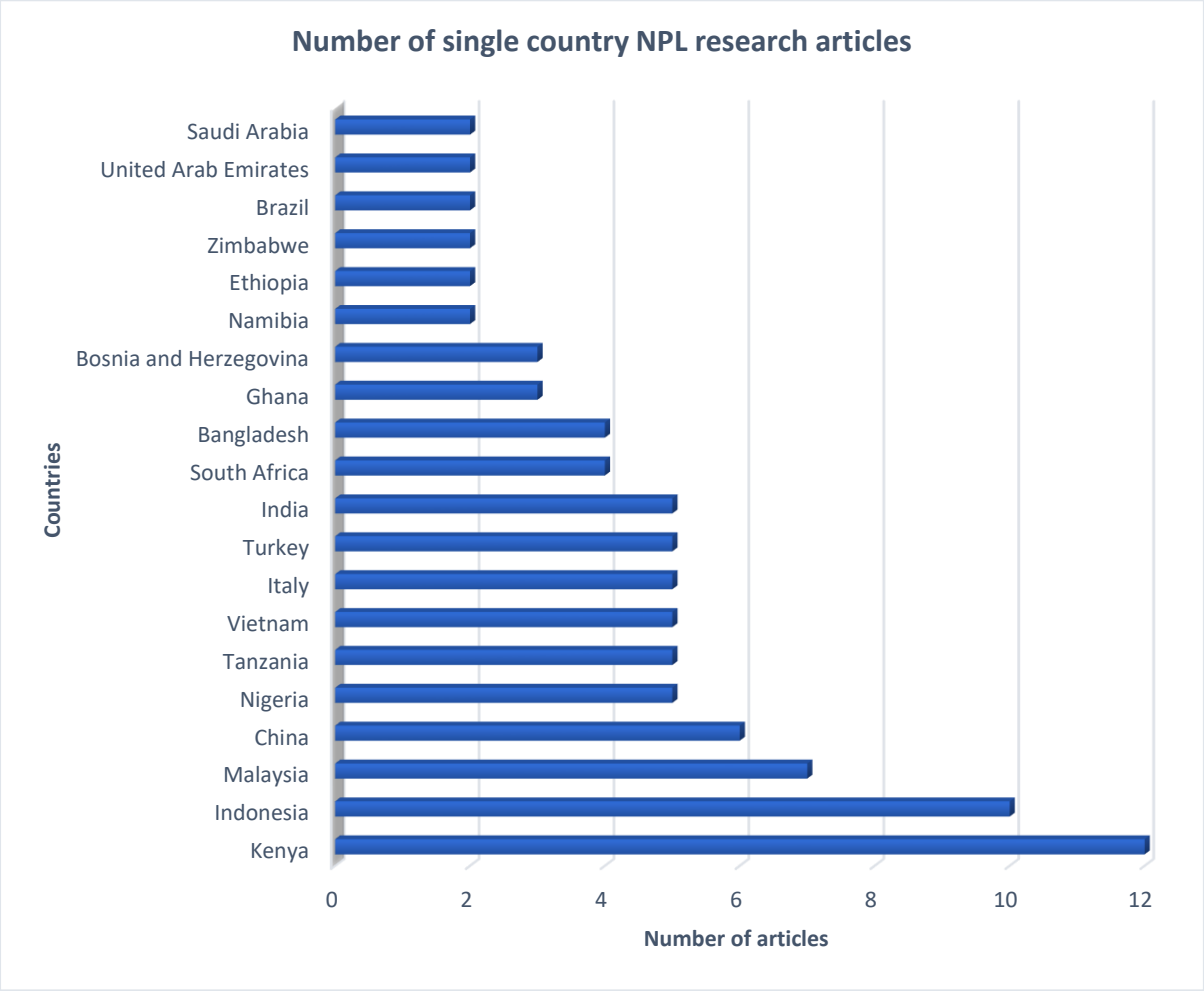
Table 1. Number of regional NPL studies	
Regions & Regional Blocs	#
Europe	34
Africa	24
Asia	16
Asia-Pacific	4
North America	2
Latin America and Caribbean	1
Brazil, Russia, India, China, and South Africa (BRICS) countries	11
Middle East and North Africa (MENA) countries	10
Association of Southeast Asian Nations (ASEAN) countries	10
Gulf Cooperation Council (GCC) countries	6
South Asian Association for Regional Cooperation (SAARC) countries	5
Organization for Economic Co-operation and Development (OECD) countries	2
Output is generated from the manual count of the search result from Google Scholar from 2020 to mid-2024	

Source: Google Scholar (from 2020 to mid-2024)

3.2. Countries with the most NPL research

It is important to identify countries with the highest number of NPL research studies. Observation from Google Scholar search results – from the first page to the fifteenth page of the search results – show that there are more single-country NPL research studies focusing on China, Malaysia, Indonesia, and Kenya. In contrast, few NPL research studies focus on countries like India, Ethiopia, Zimbabwe, Brazil, UAE, and Saudi Arabia. This finding indicates that more NPL studies are needed that focus on India, Ethiopia, Zimbabwe, Brazil, UAE, and Saudi Arabia.

Figure 2. Number of single country NPL research articles



Source: Google Scholar (2020 to mid-2024)

3.3. Top research areas/themes

It is also important to identify the top research areas or research themes in the recent empirical literature (see table 2). The topmost research areas are 'the determinants of NPL', 'the impact of bank NPL on profitability', 'the behavior of NPL during the COVID-19 pandemic', and 'NPL as an indicator of bank risk and credit risk'. However, studies that conduct literature review on NPL are very scant in the recent literature. This indicates that more literature review studies are needed in the literature.

Table 2. Top Research Areas/Themes in the recent NPL Literature

Rank	Research Areas/Themes	Number of articles
1st	Determinants of NPL / Factors affecting NPL	112
2nd	Impact of NPL on bank profitability	56
3rd	Behavior of NPL during the COVID-19 pandemic	45
4th	NPL as an indicator of bank risk and credit risk	35
5th	NPL and financial stability	32
6th	NPL and bank lending	21
7th	NPL and financial/banking crisis	19
8th	Literature review on NPL	9

Source: Google Scholar (curated on 17/06/2024)

Source: Google Scholar (from 2020 to mid-2024)

3.4. Common theories used in the recent NPL literature

Several studies in the recent NPL literature use a number of theories or hypotheses to explain the behavior of NPL. The theories used in the recent NPL literature include agency theory, moral hazard theory, stakeholder theory, financial intermediation theory, information asymmetry theory, market power theory, capital buffer theory, liquidity preference theory, loan pricing theory, and trade-off theory (see table 3). The most common theories used by NPL scholars are the agency theory, stakeholder theory, the information asymmetry theory and the moral hazard theory. Among these three theories, the moral hazard theory and agency theory have proven to be the most effective in explaining the behavior of NPL because the two theories argue that the lack of monitoring of borrowers is a potential cause of rising nonperforming loans. If borrowers are constantly monitored, lenders will be able to prevent borrowers from engaging in activities, or taking actions, that impair their ability to repay loans. Also, the theories that have been newly applied to NPL research include the market power theory, capital buffer theory, liquidity preference theory, loan pricing theory, and trade-off theory. These theories have been newly applied to NPL research because of the growing inter-disciplinary nature of NPL research and the need to use theories from the economics discipline to explain the behavior of NPL.

Table 3. Common theories used in the recent NPL literature

Rank	Theory	Studies that have used the theory to explain NPL
1	Agency theory	Ngungu and Abdul (2020); Owonye and Obonofiemro (2022); Kim Quoc Trung (2022); Tarchouna et al (2022); Wengerek et al (2022)
2	Moral hazard hypothesis/theory	Mohamad and Jenkins (2021); Lee et al (2020); Cicchiello et al (2022)
3	Stakeholder theory	Kim Quoc Trung (2022); Liu et al (2023); Iqbal and Nosheen (2023)
4	Information asymmetry theory	Owonye and Obonofiemro (2022) Do et al (2020); Olarewaju (2020); Park and Shin (2021)
5	Financial intermediation theory	Owonye and Obonofiemro (2022); Alnabulsi et al (2023a)
6	Market power theory	Ngungu and Abdul (2020)
7	Capital buffer theory	Ngungu and Abdul (2020)
8	Liquidity preference theory	Ngungu and Abdul (2020)
9	Loan pricing theory	Owonye and Obonofiemro (2022)
10	Trade-off theory	Duong et al (2023)
11	Diversification theory	Duong et al (2023)
12	Pecking Order theory	Duong et al (2023)
13	Modern portfolio theory	Do et al (2020)
14	Charter value theory	Cicchiello et al (2022)

Source: Google Scholar (from 2020 to mid-2024)

3.5. Journals with the highest single-study citation

It is also important to recognize the journals in which the most-cited articles have been published in, as these journals tend to have a wider readership. Table 4 shows that three journals have over 100 citations since 2020 namely the 'Asian Journal of Accounting Research', 'Journal of Banking and Finance', and 'Finance Research Letters'. These journals are high-impact journals that publish scholarly research on NPL. The 'Asian Journal of Accounting Research' ranks first among the journals listed in table 4.

Table 4. Journals with the highest single-study citation

Journals	Top citations (as at 17th June 2024)	Scopus quartile ranking (as of June 2024)	The article
Asian Journal of Accounting Research	234	Q2	Khan et al (2020)
Finance Research Letters	132	Q1	Karadima and Louri (2021)
Journal of Banking & Finance	109	Q1	Ari et al (2021)
Journal of Asian Finance, Economics and Business	97	Nil	Singh et al (2021).
International Journal of Forecasting	91	Q1	Bellotti et al (2021)
Journal of Risk and Financial Management	76	Q1	Ahmed et al (2021)
North American Journal of Economics and Finance	73	Q1	Serrano (2021)
Journal of Economic Studies	64	Q1	Staehr and Uusküla (2021)
International Review of Financial Analysis	53	Q1	Karadima and Louri (2020)
Journal of Central Banking Theory and Practice	51	Q2	Žunić et al (2021)

The citation counts are obtained from Google Scholar while the quartile ranking are obtained from Scopus database as at June 2024

Source: Google Scholar (2020 to mid-2024)

4. Thematic review of the recent NPL literature

This section presents the dominant themes in the recent NPL literature which are the bank-specific determinants of NPL, external determinants of NPL, effect of NPL on bank lending, effect of NPL on bank performance, effect of NPL on financial stability and the effect of NPL on the wider economy. The summary is presented in table 5.

4.1. Bank-specific determinants of NPL

The recent empirical literature identifies several bank specific determinants of NPL which can be divided into bank-specific 'financial' determinants of NPL and the bank-specific 'non-financial' determinants of NPL. The identified bank-specific 'financial' determinants of NPL include loan growth, net interest margin, loan loss provision, bank diversification, operating efficiency, bank size, bank profit, interest rate (Ahmed et al, 2021); income diversification (Ciukaj and Kil, 2020; Khan et al, 2020; Ristić and Jemović, 2021); capital adequacy ratio (Kryzanowski et al, 2023; Pancotto et al, 2024); operating cost (Nguyen, 2024); return on equity (Erdas and Ezanoglu, 2022); return on asset (Kjosevski and Petkovski, 2021); liquidity ratio (Msomi, 2022), and bank business model (Farnè and Vouldis, 2024). The identified bank-specific 'non-financial' determinant of NPL in the recent empirical literature is corporate governance (Tarchouna et al, 2022).

4.2. External determinants of NPL

The recent empirical literature also identifies several external determinants of NPL which can be divided into macro 'economic' determinants of NPL and the macro 'non-economic' determinants of NPL. The identified macro 'economic' determinants of NPL include exchange rate (Nathan et al, 2020; Ahmed et al, 2021); economic growth (Nguyen, 2024); GDP (Erdas and Ezanoglu, 2022); the lending rate or interest rate in the economy (Nathan et al, 2020); inflation rate (Msomi, 2022); unemployment rate (Ristić and Jemović, 2021); the economic environment and loose financing conditions (Gamba-Santamaria et al, 2024); public debt (Foglia, 2022); economic policy uncertainty (Karadima and Louri, 2021; Ozili, 2022b); current account balance, real house prices (Staehr and Uusküla, 2021); sovereign debt and money supply (Anita et al, 2022). The identified macro 'non-economic' determinants of NPL include political risk (Ahmed et al, 2021); fintech inputs (Wang et al, 2023); the systemic risk status of the bank (Ozili, 2020); the COVID-19 pandemic (Kryzanowski et al, 2023; Trung, 2024); the independence and transparency of the central bank (Mamoon et al, 2024); the fintech era (Ozili, 2022a), the size of shadow banking activity (Isayev and Farooq, 2024); financial inclusion (Ozili and Adamu, 2021), country risks (Saliba et al, 2023); government ineffectiveness (Giammanco et al, 2023), and regulatory quality (Ahiase et al, 2024).

4.3. Effect of NPL on bank lending

Some studies focus on the effect of NPL on bank lending. Gjeçi et al (2023) investigate whether the level of NPL affects bank lending. They examine banks from 42 countries from 2000 to 2017. They find a significant negative relationship between NPL and bank lending. In a related study, Serrano (2021) analyzes the balance sheet of European banks to determine the effect of NPL on bank lending to the real economy after the global financial crisis. They analyze 75 European banks from 2014 to 2018 and find that high NPL decrease bank lending to the real economy while banks with a decelerating level of NPL lend more to the real economy. Ahmed et al (2024) analyse the impact of NPL on the lending behaviour of 10 national banks in Arab countries from 2016 to 2020. The study uses the pooled OLS regression method and find that NPL has a negative effect on bank lending behaviour. This implies that large NPL discourage bank lending in Arab countries. Tölö and Virén (2021) examine the impact of the post-crisis resurgence of NPL on bank lending in Europe after controlling for loan demand factors from 2014 to 2019. They use quarterly data of 200 banks in 30 countries in the European Economic Area. They find that high NPL lead to credit contraction in Europe. They also find that NPL decrease bank profits, increase bank funding costs, and erode bank capital.

4.4. Effect of NPL on bank performance

Other studies examine the effect of NPL on bank profitability. For instance, Lawrence et al (2024) examine the effect of NPL on bank profitability in small and big banks in South Africa from 2008 to 2017.They find that NPL has an adverse effect on the return on assets of South African banks and NPL has a lesser effect on the return on equity of small banks compared to big banks. In a related study, Kumari et al (2024) find that high NPL decreases the profitability of private and public sector banks in India while Iqbal and Saeed (2023) examine how NPL in banks' financial statements shape manager's sentiments about bank performance or profitability. They examine large banks from 16 emerging economies from 2007 to 2018 and find that managerial sentiments about bank profitability are affected by the size of NPL reported in banks' financial statements. Duong et al (2023) also examine the impact of NPL on the financial performance of 37 banks in Vietnam. They use the fixed effect models and the two-step system GMM regression and find that NPL decrease the profitability of Vietnamese banks. Phung et al (2022) examine the impact of NPL on the efficiency of US commercial banks from 1994 to 2018. They adopt an advanced data envelopment analysis method to estimate bank efficiency and find a negative relationship between NPL and bank efficiency.

4.5. Effect of NPL on financial stability

Some studies examine the effect of NPL on financial stability. For instance, Kulu and Osei (2024) examine the effect of NPL in sub-Saharan Africa (SSA). They examine 33 SSA countries from 2007 to 2018 using panel regression and GMM regression methods. They find that higher NPL lead to higher financial instability in SSA. In a related study, Sain and Kashiramka (2023) examine the determinants of financial stability in BRICS countries. They examine 776 banks from 2005 to 2020 using panel regression and system GMM methods. They find that NPL has a negative impact on financial stability while institutional quality promotes financial stability in BRICS countries. Alnabulsi et al (2023b) undertook a survey of existing studies and find a consensus among scholars that NPL lead to financial distress. Elfergani et al (2024) examine the effect of bank NPL on bank loan loss provisions in GCC banks from 2012 to 2021. They find that higher NPL lead to higher loan loss provisions for Gulf banks.

4.6. Effect of NPL on the wider economy

Some studies examine the effect of NPL on the wider economy. For instance, Alam et al (2024) examine the effect of NPL on foreign direct investment inflows in 8 South Asian Association of Regional Cooperation countries from 2011 to 2019. They find that high NPL reduce the inflow of foreign direct investment. Huljak et al (2022) also examine the effect of bank NPL on the economy of 12 Euro area countries and find that high NPL decrease bank lending, increase bank lending spreads and lead to a decline in real GDP growth. Zhang et al (2022) focus on the Organization for Economic Corporation and Development (OECD) countries.

Zhang et al (2022) examine the relationship between financial inclusion, bank NPL, and economic growth. They analyse 21 OECD countries using the dynamic panel regression estimation and find a long-run relationship between financial inclusion, bank NPL, and economic growth. They also find that high NPL is associated with lower levels of financial inclusion and economic growth. Finally, the studies reviewed in this section shows that the most common effects of bank NPL are its depressive effect on bank lending, its tendency to cause financial instability and its depressive effect on bank performance in terms of profitability and efficiency.

Table 5. Summary of the thematic review of the recent NPL literature

S/N	Major themes	Findings in the theme	Studies
1.	Bank-specific determinants of NPL	Loan growth; net interest margin; loan loss provision; bank diversification; operating efficiency; bank size; bank profit; interest rate; capital adequacy ratio; return on equity; return on asset; liquidity ratio; bank business model; corporate governance.	Ahmed et al (2021), Ciukaj and Kil (2020), Khan et al (2020), Ristić and Jemović (2021), Kryzanowski et al (2023), Pancotto et al (2024), Nguyen (2024), Erdas and Ezanoglu (2022), Tarchouna et al (2022), Farnè and Vouldis (2024), Msomi (2022), Kjosevski and Petkovski (2021).
2.	External determinants of NPL	Exchange rate; economic growth; GDP; the lending rate; inflation rate; unemployment rate; the economic environment; loose financial conditions; public debt; economic policy uncertainty; current account balance; real house prices; sovereign debt; money supply; political risk; fintech inputs; the systemic risk status of the bank; the COVID-19 pandemic; the independence and transparency of the central bank; the fintech era; the size of shadow banking activity; financial inclusion; country risks; governmental ineffectiveness; and regulatory quality.	Nathan et al (2020), Nguyen (2024), Erdas and Ezanoglu (2022), Msomi (2022), Ristić and Jemović (2021), Gamba-Santamaria et al (2024), Foglia (2022), Karadima and Louri (2021), Staehr and Uusküla (2021) Anita et al (2022), Kryzanowski et al (2023), Wang et al (2023), Mamoon et al (2024), Isayev and Farooq (2024), Ozili and Adamu (2021), Ahiase et al (2024), Ozili (2020)
3.	Effect of NPL on bank lending	High NPL decreases bank lending. It decreases lending to the real economy after the global financial crisis.	Tölö and Virén (2021), Gjeçi et al (2023), Serrano (2021), Ahmed et al (2024).
4.	Effect of NPL on bank performance	High NPL decreases the return on equity, the profitability or financial performance of banks. It also decreases bank efficiency.	Lawrence et al (2024), Kumari et al (2024), Iqbal and Saeed (2023), Duong et al (2023), Phung et al (2022).
5.	Effect of NPL on financial stability	High NPL increases financial instability, financial distress and it leads to higher loan loss provisions.	Kulu and Osei (2024), Sain and Kashiramka (2023), Alnabulsi et al (2023b), Elfergani et al (2024).
6.	Effect of NPL on the wider economy	High NPL leads to a decrease in foreign direct investment inflow, decline in real GDP growth, low levels of financial inclusion.	Alam et al (2024), Huljak et al (2022), Zhang et al (2022).

Source: Summary of author's regional review of literature

5. Non-performing loan research from around the world

This section presents an overview of the recent NPL research around the world. This section reviews the recent empirical NPL research from different regions, regional blocs, single countries and from cross-country contexts. The summary is presented in table 6.

5.1. Research from European countries

In the European region, Zeqiraj et al (2024) examine the effect of economic policy uncertainty (EPU) on the NPL of 194 banks in 19 Eurozone countries from 2001 to 2021. They find that rising EPU is associated with higher NPL. In a related study, Ciukaj and Kil (2020) investigate the determinants of NPL in some EU countries (i.e., Bulgaria, Croatia, Cyprus, Italy, Ireland, Greece and Portugal) from 2011 to 2017. They find that bank concentration and the interest rate on new loans are positive determinants of NPL in the EU countries examined. Farnè and Vouldis (2024) examine whether retail-oriented banks have fewer NPL in Euro Area countries. They find evidence that Euro Area banks following a retail-oriented financial intermediation business model have fewer NPL in their loan portfolio compared to banks that have more market activities. Staehr and Uusküla (2021) focus on the external determinants of bank NPL in EU countries. They analyze two group of EU countries for over 20 years. They find that GDP growth is a negative determinant of bank NPL while inflation and the size of debt is a positive determinant of bank NPL in Europe. The authors also find that current account balance and real house prices are determinants of NPL in Western European countries but not in Central and Eastern European countries. In summary, evidence from the European region suggests that the main determinants of NPL in the region are bank concentration, the interest rate on new loans, the business model of EU banks, GDP growth, size of debt, current account balance and real house prices. Meanwhile, there is no common determinant among the European regional studies reviewed in this section.

5.2. Research from Asian countries

In the Asian region, Arham et al (2020) examine the effect of macroeconomic factors and country governance factors on bank NPL in emerging Asian countries. They use the panel regression method and find that unemployment rate and real interest rate have a significant positive effect on bank NPL while the external debt/GDP ratio and inflation rate have a significant negative effect on bank NPL in emerging Asia. In a related study, Anita et al (2022) investigate the macroeconomic determinants of bank NPL in 8 South Asian Association for Regional Cooperation countries (SAARC) consisting of Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan, and Sri Lanka. They analyse the data using panel OLS, fixed effect and random effect regression methods and the sample period is from 2008 to 2019. They find that GDP, sovereign debt, inflation rate, and money supply have a negative impact on bank NPL.

Loang et al (2023) also examine the bank-specific and macroeconomic determinants of bank NPL in 7 Southeast Asian countries (i.e., Cambodia, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam) during the pre-COVID-19 period and the COVID-19 pandemic period. The authors use the panel data regression and the distributed lagged regression methods. They find that the bank-specific determinants have a more significant effect on NPL compared to the macroeconomic determinants. The macroeconomic factors have a stronger effect on NPL during the pandemic, while the bank-specific determinants have an insignificant effect on NPL during the pandemic. Furthermore, the bank-specific determinants have a more significant effect on NPL in emerging countries while the macroeconomic determinants have a more significant effect on NPL in developed countries.

Nor et al (2021) was interested in determining whether the internal and external determinants of NPL differ in the Middle East countries, Southeast Asian countries and in South Asian countries. They examine NPL determinants in 9 Asian countries from 2000 to 2014. They employ the two-step system GMM method and find that higher GDP growth and higher liquid assets to total assets ratio significantly decrease NPL, and the result is consistent in Middle East countries, Southeast Asian countries and in South Asian countries. Vithessonthi (2023) examines whether loan growth is an internal determinant of NPL in Asian countries. The author was interested in determining whether increase in loan growth leads to higher NPL. The study analyses publicly listed banks in 17 Asian countries from 1995 to 2014 and find that loan growth and banking sector development are determinants of NPL in Asian countries, and the positive effect of loan growth on NPL is stronger during financial crisis periods.

Furthermore, Hernawati et al (2021) examine the effect of gross domestic product, gross loan, and capital adequacy ratio on the NPL of Islamic banks in 7 countries in the Asia-Pacific region from 2013 to 2020. They use a panel fixed effect model and find that gross loan, capital adequacy ratio and GDP are significant determinants of NPL in Islamic banks in the Asia-Pacific region. Giammanco et al (2023) was interested in understanding how government failures affect banking sector NPL in the Asian region. Giammanco et al (2023) analyse the effect of government failures on NPL in Asian countries from 2000 to 2020. The proxies for government failures are the percentage of public debt to gross domestic product and the World Bank's government effectiveness index. The authors employ the panel generalised regression model and find that government failures increase NPL in Asian countries.

In summary, evidence from the Asian region suggests that the main determinants of bank NPL in the region are the unemployment rate, real interest rate, external debt/GDP ratio, GDP, sovereign debt, inflation rate, money supply, government failures, GDP growth, liquid assets to total assets ratio, loan growth, banking sector development, gross loan and capital adequacy ratio. Meanwhile, the determinants which are common among the Asian regional studies reviewed in this section are GDP, debt, and loan growth.

5.3. Research from African countries

In the African region, Ahiase et al (2024) investigate the macroeconomic determinants of bank NPL in 53 African countries from 2005 to 2021. They use the panel random effect and GMM regression methods. They find that debt-to-GDP ratio, unemployment rate, regulatory quality, government effectiveness and inflation are significant determinants of bank NPL. Msomi (2022) examines the macroeconomic and bank-specific determinants of bank NPL in West African countries from 2008 to 2019. The author analyses 47 listed commercial banks from Nigeria (19 banks), Benin (14 banks), Burkina Faso (3 banks), Gambia (3 banks), Guinea (3 banks), and Liberia (5 banks). The study uses the panel fixed and random effects regression methods, and find that liquidity ratio, capital adequacy ratio and inflation rate are significant determinants of bank NPL in West Africa. Furthermore, Kalu et al (2021) investigate the macroeconomic and bank-specific determinants of NPL in the West African Monetary Zone (WAMZ) from 2003 to 2018. They find that both bank-specific and macro-economic determinants have a significant effect on NPL in WAMZ, but the determinants have a non-linear effect on NPL rather than a linear effect.

Asemota et al (2023) examine the bank-specific and macroeconomic determinants of NPL in sub-Saharan Africa from 2012 to 2021 using the dynamic GMM regression method. The findings indicate that bank quality, monetary policy and bank operations are significant determinants of bank NPL in the region. Adu (2022) investigates the impact of competition on the NPL of 200 banks in 16 countries in sub-Saharan Africa from 2007 to 2018. The study employs the two-step system GMM and two-stage least-squares regression methods and find that high levels of competition increase NPL in the banking sector. Adesina and Mwamba (2021) examine the effect of the Basel III net stable funding ratio (NSFR) requirement on bank NPL in Africa. They examine 376 commercial banks in 38 African countries from 2005 to 2015. They use GMM and panel fixed effect regression methods. They find that the NSFR has a negative effect on bank NPL which implies that a high stable funding decrease bank NPL. Olarewaju (2020) investigate the determinants of bank NPL in some African countries. The study examines 110 commercial banks in 9 countries from 2010 to 2017 using the system GMM regression method. The study finds that lagged NPL, lending rate, capital adequacy, credit growth, cost income ratio and real interest rate are significant determinants of NPL in the banking sector of African lower middle-income countries.

Brei et al (2020) investigate the effect of bank competition on bank stability in Sub-Saharan Africa. They examine the financial statements of 221 banks in 33 countries from 2000 to 2015. They find a U-shaped relationship between bank competition and bank NPL. They observe that higher levels of bank competition are associated with lower NPL up to a certain threshold. They also find that more competition increases NPL above a threshold. They further find that the macroeconomic determinants of NPL are GDP growth, public debt, economic concentration, financial development, and the regulatory environment. Chinoda and Kapingura (2023) also examine the effect of bank competition and digital financial inclusion

on bank stability in Sub-Saharan Africa from 2014 to 2020 using the two-step system GMM regression method. Bank stability was measured using the NPL ratio. They find that higher digital financial inclusion leads to fewer NPL while bank competition has a significant negative effect on bank NPL in Sub-Saharan Africa. Ali et al (2023) examine the impact of gender on the NPL of 43 microfinance institutions from 19 sub-Saharan Africa from 2010 to 2016. They use the seemingly unrelated regressions estimator to analyse their data. They find that female loan officers' monitoring did not have any impact on bank NPL.

Finally, evidence from the African region shows that the main determinants of bank NPL in the region are mostly internal factors, macroeconomic factors, institutional factors and regulatory factors such as the debt-to-GDP ratio, unemployment rate, regulatory quality, government effectiveness, inflation rate, liquidity ratio, capital adequacy ratio, monetary policy, bank operations, bank competition, net stable funding ratio, lending rate, credit growth, cost income ratio, real interest rate, GDP growth, public debt, financial development, regulatory environment, digital financial inclusion, and gender. Meanwhile, the determinants which are common among the African regional studies reviewed in this section are inflation, capital adequacy ratio, lending rate, competition, debt, and the regulatory environment.

5.4. Research from MENA Region

In the Middle East and North Africa (MENA) region, Alnabulsi et al (2022) investigate the bank-specific and macroeconomic determinants of bank NPL in the MENA region. They divide the sample into two periods: the global financial crisis and the COVID-19 pandemic. They analyse 74 banks in 11 MENA countries from 2005 to 2020 using the two-stage system generalized method of moment (GMM) estimator. The authors find that NPL is more sensitive to bank-specific factors than macroeconomic factors in the financial crisis sample while no significant effect is found in the COVID-19 pandemic sample. Hakimi et al (2022) examine the effect of government stability and corruption on bank NPL in the MENA region from 2004 to 2017. They find that corruption and government stability are significant determinants of bank NPL. In a related study, Hakimi et al (2024) investigate the effect of financial inclusion on NPL in the MENA region. They analyse MENA banks from 2004 to 2017 using the system GMM regression method. They analyse the usage and access dimensions of financial inclusion and its effect on NPL and find that higher levels of financial inclusion reduce the level of NPL in the MENA region. Mohamad and Jenkins (2021) investigate the impact of country-wide corruption on the NPL of 197 banks in 16 countries in the MENA region from 2011 to 2019. They use the interactive fixed effect estimation method and find a significant positive impact of corruption on bank NPL. They also find that corruption has a positive effect on NPL in banks with high risk aversion.

Boussaada et al (2022), Alaoui Mdaghri (2022) and Mahrous et al (2020) focus on the effect of financial factors on bank NPL in the MENA region. Boussaada et al (2022) analyze the nonlinear relationship between liquidity risk and NPL in MENA banks from 2004 to 2017. They

use the panel smooth transition regression method and find that there is a threshold effect in the relationship between liquidity risk and bank NPL. They also find that bank NPL is sensitive to bank performance, bank capital, bank size, global financial crisis, and the inflation rate. In a related study, Alaoui Mdaghri (2022) examines the effect of bank liquidity creation on bank NPL in the MENA region. They examine 111 commercial banks in 10 MENA countries from 2010 to 2017 using the two-step system GMM regression method. They find a significant negative effect of bank liquidity creation on NPL, meaning that liquidity creation through both on- and off-balance sheet activities decrease bank NPL in MENA countries. Mahrous et al (2020) investigate the effect of the monetary policy rate on bank NPL in MENA countries. They find that the monetary policy rate has a negative effect on bank NPL, implying that a high monetary policy rate increases the burden on existing borrowers, and it makes it difficult for new borrowers to access new loans. It discourages further borrowing and decreases bank NPL.

In summary, the evidence from the MENA region suggests that the main determinants of NPL in the region are mostly bank-specific factors, macro-financial factors, macro-economic factors, and institutional factors such as country-wide corruption, financial inclusion, liquidity risk, bank performance, bank capital, bank size, global financial crisis, inflation rate, the monetary policy rate, and liquidity creation through both on- and off-balance sheet activities. Meanwhile, the determinant which is common among the MENA regional studies reviewed in this section is corruption.

5.5. Region of Americas, BRICS, G20 and G7 countries

In the region of the Americas, Ozili (2024) examines the correlation between banking sector NPL and the level of sustainable development. The author finds a significant positive correlation between bank NPL and the constructed sustainable development index in the region of the Americas. The author also finds a positive correlation between NPL and the attainment of SDG4, SDG7 and SDG10 in the region of the Americas. DaSouza et al (2023) focus on Caribbean countries. DaSouza et al (2023) examine the impact of the COVID-19 pandemic on the NPL of banks in the Eastern Caribbean Currency Union. They use a financial stress testing model and find that the COVID-19 pandemic led to increase in the NPL of banks in the Eastern Caribbean Currency Union.

Erdas and Ezanoglu (2022) focus on G20 countries. They examine the determinants of bank NPL in G20 countries between 1998 and 2017. They find that return on equity, credit growth and credit costs are positive determinants of NPL, while capital adequacy and GDP are negative determinants of bank NPL. Ozili (2022b) focus on G7 countries. Ozili (2022b) examines the correlation of EPU and bank NPL from 2008 to 2017 and finds that EPU is negatively correlated with bank NPL in G7 countries. Saliba et al (2023) focus on the BRICS countries. They investigate the impact of country risks on banking sector NPL in Brazil, Russia, India, China, and South Africa (BRICS) countries. They assess whether country-specific risks

affect bank NPL during the 2004 to 2020 period and using the quantile estimation method. They find that higher country risks increase bank NPL in BRICS countries. Kumar et al (2023) focus on the GCC countries. They investigate the determinants of bank NPL in GCC countries from 2000 to 2018. They analyse the data of 53 conventional banks using the system GMM regression method and find that high non-oil real GDP growth rate and high inflation increase NPL while elevated levels of domestic private credit and a high volatility index lower the size of NPL.

In summary, evidence from other regions shows that the determinants of bank NPL are mostly bank-specific and macro factors such as return on equity, credit growth, credit costs, EPU, country risks, non-oil real GDP growth rate, inflation, domestic private credit and the volatility index. Meanwhile, the determinants which are common among the empirical studies reviewed in this section are GDP and GDP growth.

5.6. Single country studies

Single country studies are important because the findings from such studies often take into account the peculiar characteristics of each country and the unique economic factors that are prevailing in the country which may affect bank NPL. Many single country studies have emerged since 2020. For instance, in the case of the United States, Tarchouna et al (2022) examine the impact of banks' corporate governance on NPL. They examine 184 US commercial banks from 2000 to 2013 and using the dynamic panel GMM estimation. They find that small banks with weak corporate governance systems have high NPL. In the case of China, Wang et al (2023) examine whether fintech inputs are a determinant of bank NPL. They analyse 432 branches of the commercial banks in the city of Beijing in China from 2005 to 2022. The fintech inputs used in their study are the personnel inputs, software inputs, and hardware inputs which are used in banking operations. They find that Fintech inputs decrease the level of NPL, but the fintech inputs have a lag effect in reducing the size of NPL. In a related study, Kryzanowski et al (2023) examine the effect of the COVID-19 pandemic on the NPL of Chinese banks. They find that the COVID-19 pandemic increases bank NPL while well-capitalized banks are more effective in controlling their NPL ratio during the pandemic.

Furthermore, in Vietnam, Nguyen (2024) analyzes the determinants of NPL in Vietnamese banks from 2005 to 2020. They show that bank profits, bank size and economic growth decrease NPL while operating cost and loan loss provisions increase NPL. In another related study, Trung (2024) investigate the impact of the COVID-19 pandemic on bank NPL in Vietnam from 2011 to 2021. They find that the COVID-19 pandemic increases the NPL of Vietnamese banks. In the case of Pakistan, Khan et al (2020) focus on the determinants of bank NPL in Pakistan from 2005 to 2017. They analyze listed commercial banks using fixed and random effects panel regression methods. They find that operating efficiency and profitability have a significant negative effect on NPL, while capital adequacy and income diversification have a negative effect on NPL. In a related study, Ahmed et al (2021) examine the macroeconomic

and bank-specific determinants of NPL in Pakistan from 2008 to 2018 using the system GMM estimator. They find that credit growth, net interest margin, loan loss provisions, operating efficiency, bank size, and GDP growth are determinants of NPL. In the case of Italy, Foglia (2022) investigate the macroeconomic determinants of NPL in Italy from 2008Q3 to 2020Q4 using the autoregressive distributed lag (ARDL) cointegration model. The author finds that gross domestic product, public debt, unemployment rate and domestic credit are determinants of the NPL of Italian banks. In a related study, Pancotto et al (2024) investigate the determinants of NPL in the Italian banking sector from 2011 to 2017 and using dynamic panel data methods. They find that well capitalized banks have fewer NPL.

In the context of Uganda, Nathan et al (2020) examine the determinants of NPL in Uganda's commercial banks using quarterly data for the period 2002Q1 to 2017Q2 and using ARDL and bounds test techniques. They find that a higher lending rate, real effective exchange rate and unemployment rate lead to higher NPL while higher return on asset and GDP growth rate decrease NPL. In the case of Serbia, Ristić and Jemović (2021) analyse the NPL determinants in Serbia from 2010-2019 and using a vector autoregressive model. They show that GDP, inflation, unemployment, return on assets, cost efficiency, capital adequacy ratio and income diversification are significant determinants of NPL. In the case of Colombia, Gamba-Santamaria et al (2024) examine the determinants of NPL in Colombia. They find that a favorable economic environment and loose financial conditions decrease the size of NPL in Colombian banks. Žunić et al (2021) examine the case of Bosnia and Herzegovina. Žunić et al (2021) examine the determinants of bank NPL and the effect of the COVID-19 pandemic on bank NPL in Bosnia and Herzegovina, after controlling for GDP and loan loss provisions from 2012 to 2020. The authors use the linear time series multiple regression method and show that GDP growth has a positive impact on NPL while the COVID-19 pandemic has a negative impact on NPL.

Finally, despite the peculiarities of each country reviewed in this section, it can be seen that some countries report similar determinants of NPL despite each country being different. The common determinants of NPL are GDP growth, COVID-19 pandemic, unemployment, inflation, GDP, operating efficiency, interest rate, bank size, bank profit and capital adequacy ratio.

5.7. Cross-country or international NPL research

Cross-country studies are also important because the findings from such studies can reveal the common factors across countries that affect NPL. Many cross-country studies have emerged since 2020. For instance, Mamoon et al (2024) investigate whether central bank independence and transparency are determinants of bank NPL using data from 39 countries. They find that independent central banks experience fewer NPL in the banking industry. They also find that transparent central banks with a lower degree of information symmetry experience fewer NPL. Ozili (2022a) investigate the behaviour of bank NPL in the fintech era.

The study analyses 35 developed countries from 1998 to 2016 and show that NPL is fewer in the fintech era. It was also found that countries with high domestic private credit have higher NPL in the fintech era.

Karadima and Louri (2021) argue that economic policy uncertainty (EPU) might initiate and propagate NPL. To validate their argument, they examine whether EPU has a significant effect on NPL. They examine 507 banks from four countries: France, Germany, Italy, and Spain from 2005 to 2017. They find that EPU has a positive impact on NPL, but the positive impact is moderated by higher bank concentration. Ozili and Adamu (2021) examine whether financial inclusion is a determinant of bank NPL using data from 48 countries. They use the fixed effect panel regression method and find that greater financial inclusion, in terms of formal account ownership, leads to higher NPL. Isayev and Farooq (2024) examine the impact of shadow banking activity on NPL in listed banks in 27 countries from 2002 and 2020. They find that banks headquartered in countries with high shadow banking activity have fewer NPL.

Kjosevski and Petkovski (2021) examine the macroeconomic and bank-specific determinants of NPL focusing on 21 commercial banks from three Baltics States namely Estonia, Latvia and Lithuania from 2005 to 2016. They use the GMM regression method and find that macroeconomic factors such as GDP growth, public debt, inflation, and unemployment have a significant effect on NPL while bank-specific factors such as equity to total assets ratio, return on assets, return on equity, and loan growth have a significant effect on NPL. Ozili (2020) analyses how the state of the economy affects the NPL of European global systemically important banks compared to the European global non-systemically important banks from 2004 to 2013. The author uses the panel regression method to analyse the link between NPL and GDP growth and find that global systemically important banks have fewer NPL during economic booms and during periods of increased lending, while global non-systemically important banks experience higher NPL during periods of increased lending. Kartika et al (2022) examine the effect of corporate governance on bank NPL. They analyze 440 banks in emerging market countries using Bloomberg data from 2016 to 2020. They use partial least squares regression method to analyze the data and find that financial performance is a more significant determinant of NPL than bank corporate governance indicators. Adusei and Adeleye (2022) examine the effect of credit information sharing and creditor rights protection on bank NPL in 132 countries. They find that, in the presence of creditor rights protection, the positive impact of credit information sharing on NPL is higher. Also, creditor rights protection reduces NPL in the presence of credit information sharing. Finally, the common determinant of NPL among the cross-country studies reviewed in this section is economic policy uncertainty.

Table 6. Summary of author's regional review of literature			
S/N	Regional context	Factors affecting NPL	Studies
1.	European countries	Bank concentration; interest rate on new loans; GDP growth; inflation; the size of debt.	Zeqiraj et al (2024), Ciukaj and Kil (2020), Staehr and Uusküla (2021).
2.	Asian region	Unemployment rate; real interest rate; external debt to GDP ratio; inflation rate; GDP; sovereign debt; inflation rate; money supply; GDP growth; liquid assets to total assets ratio; loan growth; capital adequacy ratio; GDP government failure.	Arham et al (2020), Anita et al (2022), Nor et al (2021), Vithessonthi (2023), Hernawati et al (2021), Giammanco et al (2023).
3.	African countries	Debt-to-GDP ratio; unemployment rate; regulatory quality; government effectiveness; liquidity ratio; capital adequacy ratio; inflation rate; bank quality; monetary policy; bank operations; bank competition; digital financial inclusion; gender; Basel III net stable funding ratio (NSFR) requirement; lagged NPL; lending rate; credit growth; cost income ratio; real interest rate.	Ahiase et al (2024), Msomi (2022), Asemota et al (2023), Adu (2022), Adesina and Mwamba (2021), Olarewaju (2020), Chinoda and Kapingura (2023), Ali et al (2023)
4	Middle East and North Africa (MENA) region	Corruption; government stability; financial inclusion; liquidity risk; bank performance; bank capital; bank size; global financial crisis; inflation rate; monetary policy rate.	Hakimi et al (2022), Hakimi et al (2024), Mohamad and Jenkins (2021), Boussaada et al (2022), Alaoui Mdaghri (2022), Mahrous et al (2020).
5.	Region of Americas, BRICS, G20 and G7 countries	Sustainable development; COVID-19 pandemic; return on equity; credit growth; credit costs; capital adequacy; GDP; EPU; country risks; non-oil real GDP growth rate; high inflation.	Ozili (2024), DaSouza et al (2023), Erdas and Ezanoglu (2022), Ozili (2022b), Saliba et al (2023), Kumar et al (2023).
6.	Single country studies	Corporate governance; fintech inputs; COVID-19 pandemic; bank profits; bank size; economic growth; bank efficiency; profitability; capital adequacy; income diversification; credit growth; loan loss provisions; economic environment; financing conditions; inflation; unemployment; capital adequacy ratio; gross domestic product; public debt; unemployment rate; domestic credit; lending rate; real effective exchange rate.	Tarchouna et al (2022), Wang et al (2023), Kryzanowski et al (2023), Nguyen (2024), Trung (2024), Khan et al (2020), Ahmed et al (2021), Foglia (2022), Pancotto et al (2024), Nathan et al (2020), Ristić and Jemović (2021), Gamba-Santamaria et al (2024), Žunić et al (2021).
7.	Cross-country and/or international NPL	central bank independence and transparency; fintech era; economic policy uncertainty; financial inclusion; shadow banking activity;	Mamoon et al (2024), Ozili (2022a), Karadima and Louri (2021), Ozili and Adamu (2021), Isayev and Farooq (2024), Kjosevski and Petkovski (2021), Ozili (2020), Kartika et al (2022), Adusei and Adeleye (2022)

Source: Summary of author's regional review of literature

6. Methodological advances and issues in NPL research

Quantitative research methods are mostly used in the recent empirical literature while qualitative methods are used sparingly.

6.1. Common baseline model used in the recent literature

The common baseline model adopted in most quantitative NPL studies is the multi-factor linear model which expresses NPL as a function of its determinants, where the NPL ratio is the dependent variable while its determinants are the independent variables (see. Karadima and Louri, 2021; Phung et al, 2022; Anita et al, 2022). Depending on the objective of the researcher, the NPL model may be expressed as a function of the bank-specific determinants of NPL, or the external determinants of NPL or a combination of both the bank-specific and external determinants of NPL. The common internal and external determinants of NPL used in the recent literature are highlighted in sections 4.1 and 4.2.

6.2. Common estimation method used in the recent literature

The common estimation method used in the recent empirical literature is the panel regression estimation method while the use of time series regression is less common (see. Tölö and Virén, 2021; Karadima and Louri, 2021; Žunić et al, 2021; Phung et al, 2022; Anita et al, 2022). When using the panel regression method, researchers often make econometric adjustments to the variables in the model by adding fixed effects, random effects, robust standard errors, first-difference, lagged NPL variable and other econometric adjustments that achieve the modelling objective of the researcher (see, for example, Khan et al, 2020; Hernawati et al, 2021; Ozili and Adamu, 2021; Tölö and Virén, 2021; Karadima and Louri, 2021; Phung et al, 2022; Anita et al, 2022). A major advancement in the recent empirical NPL literature is the frequent use of robust methodologies. These methodologies include quantile regression, two-way system GMM regression method, and the autoregressive distributed lag (ARDL) cointegration model, among others (see table 7). These methodologies are preferred in NPL research because they are effective in addressing simultaneity bias, endogeneity problems, omission bias and collinearity problems in the dataset. Another notable advancement in the literature is the continuous discovery of new non-traditional determinants of NPL such as digital financial inclusion, corruption, shadow banking, volatility index, fintech inputs and the level of sustainable development, among others (see, for example, Mohamad and Jenkins, 2021; Hakimi et al, 2022; Wang et al, 2023; Ozili, 2024; Kumar et al, 2023; Isayev and Farooq, 2024). These discoveries are helping to increase knowledge of the diverse factors that affect NPL, and they are also helping to reduce the size of the error term of NPL models by incorporating new predictors into NPL models.

6.3. Common sample period analysis and source of NPL data

In terms of the sample period covered in the recent empirical literature, many studies examine the post-financial crisis period (e.g., Ciukaj and Kil, 2020; Serrano, 2021; Tölö and Virén, 2021; Mohamad and Jenkins, 2021; Alaoui Mdaghri, 2022; Asemota et al, 2023; Chinoda and Kapingura, 2023; Ali et al, 2023; Zeqiraj et al, 2024). Other studies compare the post-crisis period with the pre-crisis period (e.g., Nor et al, 2021; Hakimi et al, 2022; Alnabulsi et al, 2022; Huljak et al, 2022). Few studies compare the global financial crisis period with the COVID-19 pandemic period (Alnabulsi et al, 2022), while other studies focus on the COVID-19 pandemic period alone (Park and Shin, 2021; Apergis, 2022). Regarding the source of NPL data, there are numerous database that offer open-access and closed-access information on bank-level NPL and industry (or country-level) NPL. They include BankFocus database (formerly, Bankscope database), Compustat, Statista, the World Bank's Global Financial Development Indicators, central bank website, banks' financial statements, Datastream and Thomson One Banker.

6.4. Variable measurement issues

Turning to the methodological issues in the recent empirical literature. A major methodological issue is the observed variation in the measurement of NPL – the dependent variable. Some studies use the actual NPL amount (without a deflator) as the dependent variable (Žunić et al., 2021). Other studies use the non-performing loans to total loans ratio (see, for example, Kjosevski and Petkovski, 2021; Chun and Ardaaragchaa, 2024). Another issue is the lack of universal consensus on what the deflator of the NPL ratio should be. Some studies use total loans as the deflator which yields the non-performing loans to total loans ratio (e.g., Kjosevski and Petkovski, 2021; Chun and Ardaaragchaa, 2024). Other studies use lagged total loans as the deflator which yields the non-performing loans to lagged total loans ratio (Chen et al, 2021). Some studies use total assets as the deflator which yields the non-performing loans to total assets ratio (López-Espinosa et al, 2021). These variations in the NPL ratio deflator makes comparison of the results of NPL research difficult.

Table 7. Common methodologies used in the recent empirical NPL literature

	Common methodologies	Studies
1	Panel least squares regression	Serrano (2021), Ciukaj and Kil (2020), El-Chaarani et al (2023a); EL-Chaarani et al (2023b)
2	Quantile regression	Serrano (2021), Saliba et al (2023).
3	Time series linear multiple regression	Žunić et al (2021)
4	Panel OLS regression with fixed and random effects	Tölö and Virén (2021), Khan et al (2020), Karadima and Louri (2021), Phung et al (2022), Anita et al (2022), Ozili and Adamu (2021), Hernawati et al (2021)
5	System and dynamic GMM regression method	Ahmed et al (2021), Hakimi et al (2024), Nor et al (2021), Adesina and Mwamba (2021), Olarewaju (2020)
6	Autoregressive distributed lag (ARDL) cointegration model	Foglia (2022), Kalu et al (2021)
7	Dynamic panel regression	Wang et al (2023), Vithessonthi (2023)
8	panel Bayesian VAR model	Huljak et al (2022)
9	Structural equation modelling based on partial least squares	Kartika et al (2022)
10	Pearson correlation	Ozili (2024)
11	Qualitative methods	Trung (2024)
12	Seemingly unrelated regressions estimator	Ali et al (2023)
13	Two-stage least squares regression	Adu (2022)

Source: Google Scholar (2020-mid-2024)

7. Areas for future research

More NPL research is needed from Pacific countries, Latin America and Caribbean countries. Presently, only a few studies examine the determinants of NPL in Pacific countries, Latin America, and Caribbean countries. These countries have the lowest number of published empirical NPL research. Determining the factors that affect NPL in these countries is important because it can help to compare the findings of such studies with the findings from African countries to determine the similarities or differences in NPL determinants, and which could lead to further comparative research in the NPL literature. Therefore, future research studies should investigate the determinants of NPL in Pacific countries, Latin America, and Caribbean countries.

Two, qualitative studies on NPL are scarce in the literature. There is a need for more qualitative studies on NPL. Researchers should use interviews, questionnaires, or surveys to elicit the opinions of bank managers and credit risk offers on the causes and consequences of NPL. The response data generated from the interviews, questionnaires or surveys of bank managers and credit risk officers can offer new insights that cannot be gained from using secondary data or quantitative research methods. Therefore, future research studies should undertake more qualitative research when investigating the determinants and consequences of NPL.

Three, more research is needed on the signaling effect of NPL. Rising NPL may signal poor management of bank loan portfolio to bank owners. It may also signal the effect of an unfavorable economic conditions on banks' lending activities. It may also signal other things such as a weak loan recovery system. NPL may have other signaling effects which remain unknown and unexplored in the literature. Therefore, future research should provide new insights that improve our understanding of the numerous signaling effects of NPL.

Four, additional research is needed on the effect of cultural factors and religiosity on NPL. Cultural factors and religiosity may influence borrowers' willingness to repay the loans owed to financial institutions. The recent NPL literature is silent about the role of cultural factors and religiosity in influencing the size of bank NPL. Future research studies should examine whether cultural factors and religiosity are potential determinants of NPL.

Five, there is a need to examine the effect of loan repayment digital technologies on NPL. There are existing digital technologies, such as mobile banking applications, that assist retail and corporate borrowers in repaying their loans remotely and quickly, thereby reducing the risk of loan default and decreasing the level of non-performing loans. The existing literature has not considered the role of such digital technologies in reducing the NPL. Therefore, future studies should consider loan repayment digital technologies as potential determinants of NPL.

Six, there is a need to consider the impact of the regulatory/supervisory style of the bank regulator/supervisor on bank NPL. This is important because commercial banks will do all it takes to minimize NPL if they understand that the bank regulator/supervisor is adopting a regulatory/supervisory style that signals to the banking industry that the regulator/supervisor is willing to allow a bank to fail if the bank is in severe distress and without a guarantee of central bank bailout. Such regulatory/supervisory inclination or style will incentivize banks to increase their effort to mitigate NPL. Future studies should test this hypothesis using empirical data.

Seven, there is a need to continuously evaluate the impact of regulation on bank NPL. For example, the Basel Committee on Banking Supervision (BCBS) implemented a regulation in 2023 that require non-performing loan securitisation exposures to be subject to 100% risk weight or higher, except for positions risk-weighted using external ratings-based approach. This regulation can increase the incidence of NPL in banks. Therefore, future studies should investigate the impact of such regulatory changes on bank NPL to offer insight into how new regulation may affect bank NPL and its implication for financial stability.

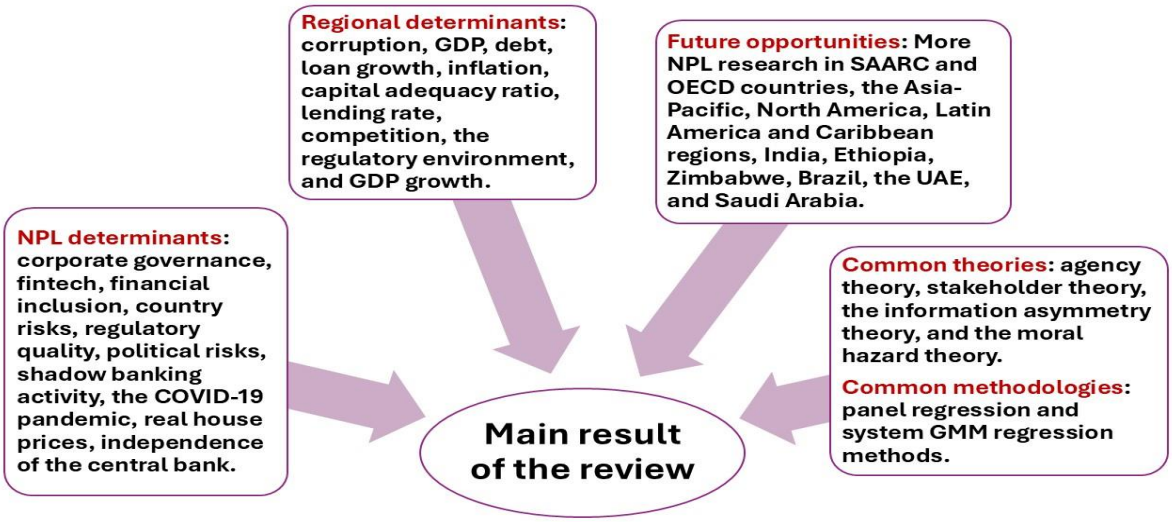
8. Conclusion

This literature review article examined the recent research into bank non-performing loans. It identified the major themes in the literature including the recent determinants of NPL and its effects across different regions of the world while also proffering some suggestions for future research.

The findings of the review revealed that recent NPL studies have made significant progress in examining the interaction between NPL and a wide range of factors such as bank-specific factors, macroeconomic factors, country-level factors, and some consequences of NPL. The newly identified determinants of NPL in the recent literature are corporate governance, fintech, financial inclusion, country risks, regulatory quality, political risks, shadow banking activity, the COVID-19 pandemic, public/external debt, real house prices, and the independence of the central bank. The common regional determinants of NPL in the recent literature are corruption, GDP, debt, loan growth, inflation, capital adequacy ratio, lending rate, competition, the regulatory environment, and GDP growth (see figure 3).

The findings also showed that more NPL research is needed from SAARC and OECD countries, and from the Asia-Pacific, North America, Latin America and Caribbean regions. It was also shown that fewer NPL research has been conducted on India, Ethiopia, Zimbabwe, Brazil, the UAE, and Saudi Arabia. The common theories used by NPL scholars are the agency theory, stakeholder theory, the information asymmetry theory, and the moral hazard theory while the common methodologies used are the panel regression and system GMM regression methods.

Figure 3. Summary of review results



Source: Author

The findings of this review have several implications. **One**, the empirical evidence presented in this study can point policymakers to the areas where they need to pay more attention to, to control the level of NPL in the banking industry and preserve bank stability. **Two**, it provides scholars with new empirical insights into what is known and what is not known so that scholars can focus their research efforts on the most important themes in NPL research. **Three**, while existing theories may not explain the new determinants of NPL, there may be a need for new theories that explain the new emerging determinants of NPL particularly the linkages between NPL and technological factors such as fintech. **Four**, the evidence presented on the consequences of NPL can assist bank managers and policymakers in understanding the consequences of NPL for financial/banking stability and in understanding the type of safeguards to put in place to minimise the adverse effects of nonperforming loans.

A limitation of the study is that the study did not review the studies that were published prior to 2020. The review only focused on studies published from 2020 to 2024. Another limitation of the study is that it relied on a single search platform which is Google Scholar. The study did not use alternative search platforms which may identify additional articles that may offer new insights to enrich the review.

Several directions for future research were suggested such as the need to conduct more qualitative NPL research, the need to investigate the signaling effects of NPL, the need to explore the effect of cultural factors and religiosity on NPL, the role of loan repayment digital technologies in reducing the incidence of NPL, and the impact of regulation on bank NPL.

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