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RESEARCH ARTICLE

The determinants of banks' credit risk: Review of the literature and future research agenda

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Abstract

Banks' credit risk, mostly conveyed by the level of non-performing loans (NPLs) and considered as a prominent threat to the banking sector stability, has been widely discussed among researchers and policymakers. Given the growing body of literature on this topic, this paper aims to provide a structured review of literature on the determinants of NPLs with a focus on the current dynamics of the field. This study discusses the main theories that shaped the debate on NPLs and their bank-specific, macroeconomic and industry-related determinants. A thorough understanding of these latter would enable policymakers, regulators and bank managers to anticipate banks' failures and, academicians to advance their research. To facilitate further knowledge in this field, this paper reviews 69 studies published between 1987 and 2019 in 40 peer-reviewed journals. We argue that despite the extensive empirical and theoretical work accomplished over the last decades, the issue of credit risk remains an unsolved line of inquiry, which leaves ample room for critical debates. Beside mapping the emerging discourse on this area, this study proposes a promising future research agenda to guide research advancement.

KEYWORDS

credit risk, literature review, loan problem, non-performing loans, NPLs

1 | INTRODUCTION

One of the most common features relating regulators and market participants is the dense thicket of jargon surrounding the topic of bank failures. As a matter of fact, the banking sector is considered as the sinew that keeps the economy working as it grants credits and allows businesses and households to save, invest and increase their spending, which ultimately support the economic growth. Without access to credits the economy will be paralysed, but without banks, the economy will not function. In this sense, one of the risks that can definitely shatter the banking sector is credit risk. The latter was the reason behind the beginning of various economic downturns; the slump of the US financial system in the 1980s, the Asian crisis during the 1990s and 2000s, the US subprime crisis and, more recently, the loans debacle of the European credit crisis. No country escaped the malaise that these events brought, poisoning their financial and economic development. Central bankers agreed that the distress of the financial sector during these economic abysses was predominantly due to banks' credit risk, mostly conveyed by the level of banks' non-performing loans (NPLs, Henceforth). By definition, a loan is considered non-performing when its payment is past due by at least 90 days (IMF, 2005, p. 8).[1]

As a matter of fact, more than 70% of the studies conducted in this research field correspond to the period between 2008 and 2019, which stresses the importance of a recent review of the literature. In the aftermath of

financial crises, strong evidence holds NPLs responsible for bank collapses (Salas & Saurina, 2002; Samad, 2012). For instance, the US subprime mortgage crisis confirmed the severity of credit risk and casted attention on NPLs as red flags. It was, indeed, the most profound economic bust since the Great Recession, making bank regulators struggling to fix a financial system that has disastrously failed. The huge number of NPLs engendered during the subprime crisis not only affected US banks, but also infected the global financial system. Due to the transactional relationships between financial institutions worldwide, once one collapses, it became a series of falling "dominoes." Besides, another incident that was caused by the accumulation of NPLs, debilitating the economy is the Eurozone crisis. The recent European credit crisis transformed the greatest economies to fragile ones. In 2013, €1 trillion worth of NPLs was recorded by EU banks (ECB, 2017). Greece and Cyprus incurred the highest shares, a NPL ratio of 46 and 45%, respectively (ECB, 2017). Spain, Italy, Portugal, Slovenia and Ireland were hard hit by the crisis as well given their huge stockpile of NPLs.[2] Thus, the largest financial markets in Europe found themselves on the edge of an epochal collapse. As a result, a significant increase in funding costs was observed and, by implication, the whole financial sector was undermined. Yet, the disproportional level of NPLs across countries represented a puzzle as in some EU countries such as Finland and Luxembourg, the NPL ratio did not exceed 2%. This puzzle retained the attention of academicians and researchers, making the topic of loan losses an appealing substance for future research. These financial turbulences attracted policymakers as well, who are today portraying NPLs as their utmost priority due to its strong impact on the stability of the economy.

Against this backdrop, various studies shed lights on the main causes of bad loans in order to prevent their future occurrence and ensure a sound banking sector. In this regard, scholars point out the importance of using both; systematic factors (macroeconomic determinants) and idiosyncratic factors (bank-specific determinants) to explain the fluctuations of NPLs (Keeton & Morris, 1987; Louzis, Vouldis, & Metaxas, 2012; Quagliariello, 2007; Salas & Saurina, 2002; Us, 2017). Other studies emphasize the significant impact of industry-related determinants such as market concentration (Beck, Jakubik, & Piloiu, 2015; Boyd & Nicolo, 2005). Notwithstanding the lack of an extensive and recent review of literature, the objective of this study is to provide a stock of relevant knowledge about the determinants of NPLs that will help guide research efforts and extend the understanding of the underlying determinants. Besides, this research aspires to map the emerging discourse on this area, identify gaps and provide a productive line of future research. To meet these objectives, the present paper aims to answer the following questions:

1. What is the state of research on the determinants of NPLs?
2. What are the future research paths on the determinants of NPLs?

To answer these questions, this study will survey, analyse and critically assess the main empirical literature on the determinants of NPLs, with an emphasis on recent findings. The reminder of the paper is structured as follows. Section 2 presents brief background definitions and classifications of NPLs. Section 3 illustrates the methodological approach used for literature collection and analysis. Section 4 discusses the findings and results. Section 5 presents and discusses the conflicting arguments documented in the literature regarding the bank-specific, macroeconomic and industry-related determinants of NPLs. Section 6 highlights the major impediments to current research and suggests paths for future research. Section 7 concludes.

2 | NON-PERFORMING LOANS: DEFINITIONS AND CLASSIFICATIONS

Loans, in a broader sense, support investment and households' spending. However, when borrowers, either firms or households, face difficulties in servicing their debts, their loans might become non-performing. The term "non-performing loans" is used worldwide by most central banks, yet its terminology differs and takes other forms such as *defaulted loans* and *impaired loans*.[3] The term "impaired loans" defines how the concept of NPLs is reported in financial statements, while "non-performing loans" and "defaulted loans" are the regulatory and prudential terms for loan problems (European Central Bank, 2016). The distinction between these terms is that not all NPLs are recognized as impaired in the accounting framework, but all impaired loans are necessarily NPLs (European Central Bank, 2016). Although differences in the terminology exist, in most cases the three terms are aligned and used by most regulators worldwide (European Central Bank, 2016). Besides, the classification of NPLs varies among countries. Several studies relied on cross-country analyses to assess the general differences in the classification of NPLs (Barisitz, 2011, 2013; Bholat, Lastra, Markose, Miglionico, & Sen, 2018). For instance, in some countries, some types of loans can be deemed as non-performing after the past due status is triggered, such as residential mortgages

loans. Loans to government or government-backed entities have a different treatment as well (Bholat et al., 2018). Barisitz (2013) conducted a research in 10 Central, Eastern and South Eastern Europe (CESEE) countries to examine the general differences between the various treatments of NPLs.[4] His findings demonstrate that some countries, for instance, show an inconsistency in whether to follow an asset-by-asset basis or to treat the entire portfolio of loans as a single one. This applies when a debtor has two or more loans from the same financial institution. If he does not service his debt on one loan, but is repaying the others, the debate is whether the whole portfolio of loans is to be classified as non-performing, since the financial state of the debtors has deteriorated (Barisitz, 2013).

These discrepancy across regulators in classifying NPLs make their comparability difficult, if not impossible. In fact, the lack of a common financial language between regulators appeared especially after the global financial crisis (Barisitz, 2013). This lack of consistency does not only present a barrier to understanding the problem of NPLs, but it puts the global financial stability at a great risk as it hindered the assessment of risk across border banking groups, as well (Tweedie, 2015). In order to achieve a higher degree of convergence, several international bodies emerged with recommendations (soft laws) and guidance reports. For instance, the Institution of International Finance (IIF) introduced technical guidelines inviting banks to follow a coherent approach to report and categorize their NPLs (Krueger, 2002). Also, in the EU context, the European Banking Authority (EBA) and the European Central Bank (ECB) have established in 2014 and 2016, respectively, admirable guidelines to tackle the issue of NPLs classifications and forbearances activities (EBA, 2014; ECB, 2017). In order to develop a more robust classification of NPLs, the Basel Committee on Banking Supervision (BCBS) published in April 2017 a detailed guideline as a complement of the existing accounting framework (BCBS, 2017). Thus, all countries adhering to the IMF and following the European Reporting Standards agree on the common definition that a loan is non-performing "when payments of interest and principal are past due by 90 days or more, or at least 90 days of interest payments have been capitalized, refinanced or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons to doubt that payments will be made in full" (IMF, 2005, p. 8).[5]

3 | METHODOLOGY

With the aim to obtain a comprehensive understanding of the topic of NPLs, a rigorous and systematic review was performed, following Bown and Sutton (2010) approach. This process starts with the identification of the subject, the scientific need and the main objectives of the review.[6] The second step focuses on literature searches and study selection criteria, while the last stage involves data abstraction and extraction (Bown & Sutton, 2010).

3.1 | Literature search

In order to ensure an extensive sampling and identify the relevant literature, we followed Webster and Waston (2002) approach. A number of academic known databases were selected, including Business Source Elite, ScienceDirect, Web of Science, Springer, Emerald Insight, JSTOR, Academic Search Premier (EBSCO), Wiley Online Library and Sage. Next, to improve the effectiveness of our electronic search, we conducted a combination of Boolean search and operators using different combinations of search terms including, inter alia, non-performing loans, NPLs, bad loans, impaired loans, credit risk and loans problem (Bown & Sutton, 2010).

3.2 | Inclusion criteria

As a result, this search resulted in the inclusion of 165 studies that tackled the issue of NPLs. Yet, for quality standards, only peer-reviewed articles published by renowned publishers were included in the final review. In this sense, the selected articles are listed in at least one of the following indices; CABS (Chartered Association of Business Schools) ranking index, ABDC (Australian Business Deans Council) Index, Web of Science Journal Citation Index and/or Scopus. After a careful reading based on a line-by-line examination of the articles, 69 papers from 40 peer-reviewed journals were considered for the final review.[7] The final sample used in this review includes articles that empirically examine the determinants of NPLs worldwide.

4 | ANALYSIS AND FINDINGS

Given that loans are the principal and most crucial products of banks, the topic of NPLs has received special attention from scholars and researchers during the last decades. In this sense, various studies document that the level of NPLs mirrors banks' assets quality and serves as a signpost of the well-being of the financial system (Cucinelli, Di, Marchese, & Nieri, 2018; Partovi & Matousek, 2019; Reinhart & Rogoff, 2011; Salas & Saurina, 2002; Tarchouna, Jarraya, & Bouri, 2017; Zhang, Cai, Dickinson, & Kutan, 2016). Other

scholars described NPLs as "financial pollution" due to their far-reaching effects on the economy (Barseghyan, 2010; Ghosh, 2015; Makri, Tsagkanos, & Bellas, 2014).

Previous research classified the factors driving NPLs to three categories: macroeconomic, bank-specific and/or industry-related factors. First, there are enormous studies that relate NPLs to the macroeconomic conditions of the country (Amuakwa-Mensah, Marbuah, & Ani-Asamoah Marbuah, 2017; Carey, 1998; De Bock & Demyanets, 2012; Klein, 2013; Salas & Saurina, 2002). These studies support the central idea that the country's business cycle affects the capacity of debtors to repay their loans. Other studies use bank-specific determinants to explain the emergence of NPLs. The principal idea of using bank internal factors, is the possible correlation that might exist between bank lending strategies, banks profitability, bank efficiency, ownership structure and loan problems (Berger & Deyoung, 1997; Boyd & Nicolo, 2005; Jiménez & Saurina, 2005; Louzis et al., 2012; Rossi, Schwaiger, & Winkler, 2009). Another stream of literature documents that the plunge of banks' NPLs can be explained by industry-related factors; such as competition and banks' concentration (Boyd & Nicolo, 2005; Natsir, Soedarmono, April Yudhi, Trinugroho, & Warokka, 2019). Lastly, an increasing number of studies highlight the influence of the regulatory and institutional environment on the level of NPLs (Ahmad, 2013; Bolisani, 2016; Boudriga, Boulila Taktak, & Jellouli, 2009; Park, 2012; Rehman, Zhang, & Ahmad, 2016). Table 3 lists the most cited research articles that investigate the determinants of NPLs.

4.1 | Publishing activity by region

The descriptive statistics of the sample reviewed indicate that the majority of the studies focused on the US and Europe while little attention was addressed to the Middle East and Africa. As a matter of fact, 30% of the studies are conducted in Europe, 19% in the United States, 15% in Asia, 7% in the Middle East and North Africa (MENA) region and only 3% of the reviewed studies focused on African countries.[8] This demonstrates the paucity of research in emerging countries, especially the Middle East and Africa.

4.2 | Publishing activity by year

Interestingly and according to the annual distribution of the sampled research articles exhibited in Figure 1, 71% of the studies conducted in this research field correspond to the period between 2008 and 2019. This increased interest can be justified by the global financial crisis of 2007–2008, which impelled researchers to conduct more granular analyses of NPLs' determinants, reputed to be the reason behind the financial collapse. This interest further increased after the European financial crisis as well. The availability of macroeconomic data as well as bank-specific data can be a potential explanation of the increase in the number of publications during the recent years.

4.3 | Publishing activity by variable types

In addition to that, this review confirms that the majority of the studies reviewed use hybrid analyses through the inclusion of both macroeconomic and bank-specific determinants to explain the fluctuations of NPLs. These studies represent 43% of the reviewed sample, while the papers that use bank-specific and macroeconomic factors separately represent 38% and 14%, respectively. The remaining subset of articles investigates the

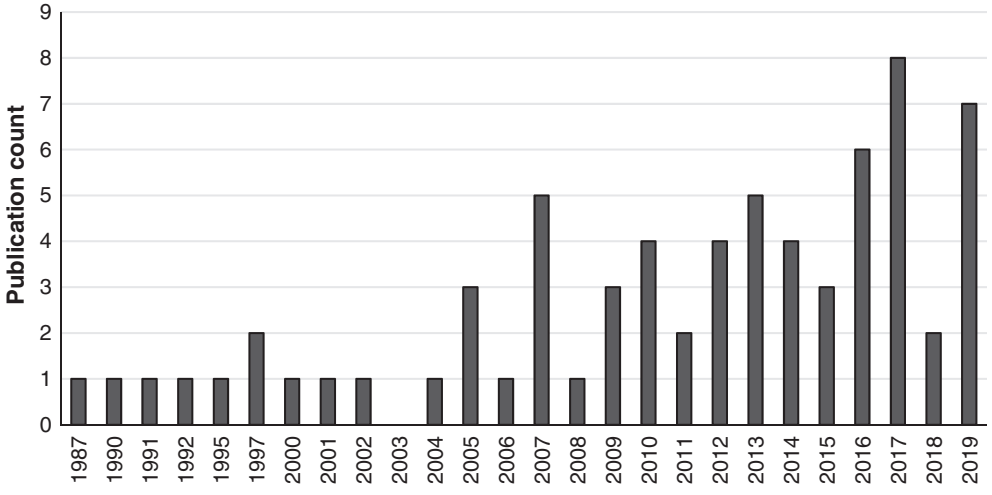

FIGURE 1 Annual distribution of the sampled research articles

industry-related factors (competition/concentration). Besides, this analysis allows us to determine the frequently used variables in the literature. Table 1 summarizes the main used variables in the literature, their proxies along with a representative sample of their use in the literature.

4.4 | Publishing journals

Based on our dataset and in terms of publications, the role of leadership goes to the *Journal of Finance and Banking* representing 13% of total publications, followed by *The American Economic Review*, *Research in International Business* and *Finance and Emerging Markets Finance and Trade*. Table 2 exhibits the number of articles published in each journal.[9]

4.5 | Publishing activity by econometric models

With regards to the methodology used in this study field, the authors of the reviewed article adopt different econometric estimators starting with simple regressions to dynamic panel models such as the two-step general methods of moments (GMM estimations). This latter, however, was used in 44% of the reviewed sample while most of the studies rely on Pooled Ordinary Least Square (POLS) or Two-Stage Least square (2SLS) models. Still, these models could result in inconsistent estimates given that data series from financial markets are distinguished by autocorrelation and heteroscedasticity (Radivojević et al., 2019). In this sense, GMM estimators have the advantages to avoid biased estimates, through the generation of correct standards errors and *p* values (Cottrell & Lucchetti, 2016).

The following section reviews the literature on the determinants of NPLs, specifically: macroeconomic, bank-specific and industry-related factors.

5 | DETERMINANTS OF NPLS: REVIEW OF RESEARCH

5.1 | Review of systematic factors

An extensive body of research asserts that the country's economic conditions have a significant impact of banks' loan losses (De Bock & Demyanets, 2012; Keeton & Morris, 1987; Klein, 2013; Salas & Saurina, 2002). The frequently used factors to gauge the variations of NPLs are presented as follows:

5.1.1 | GDP growth

Researchers agree that under good economic conditions, both households and firms, are more likely to settle their financial obligations. GDP growth has been used as the primary indicator to mirror the good status of the business cycle (Carey, 1998; Nkusu, 2011; Salas & Saurina, 2002). In this sense, Carey (1998) claims that default rates in debt portfolios are mostly explained by the state of the economy. In fact, this negative association between GDP growth and NPLs is explained by the limited revenue stream of borrowers during challenged times, resulting in an increased level of NPLs (Jiménez & Saurina, 2005; Makri et al., 2014; Vouldis & Louzis, 2017). Quagliariello (2007) conducted a research to explore the impact of economic conditions on NPLs using a panel of Italian banks spanning the period 1985–2002. He documents that banks behave cyclically, implying that, their bad loans swelled during economic slowdowns and the opposite happens during economic booms. This finding was further confirmed by Nkusu (2011) who examined 26 advanced countries during the period between 1998 and 2009. He documents that slower economic growth leads to higher NPLs. He explains this finding by the increasing asset prices and unemployment rates during such economic abyss. Recent studies present confirmatory findings and support the aforementioned relationship, stating that the country's business cycle significantly influences banks' NPLs (Dimitrios, Helen, & Mike, 2016; Gulati, Goswami, & Kumar, 2019; Jabbouri & Naili, 2019a; Kuzucu & Kuzucu, 2019; Podpiera & Ötker, 2010; Vouldis & Louzis, 2017).

5.1.2 | Unemployment

A large branch of literature used unemployment rate to reflect the country's economic condition and justify the deterioration of banks' loan quality (Dimitrios et al., 2016; Klein, 2013; Louzis et al., 2012). These studies stipulate that unemployment rate harms the functioning of the economy, which leads to higher NPLs. Louzis et al. (2012) document a positive relationship between unemployment and NPLs, arguing that this latter is the primary macroeconomic determinant of bad loans. In the same line, Lawrence (1995) linked this positive relationship to the strong association between income levels and default rates. The author claims that borrowers with low income face higher risks of unemployment, thus higher difficulties to service their debts. Besides, at equilibrium, banks tend to charge higher interest rates to low income clients, considered as the riskers ones due to the uncertainty of their income status, which, therefore, worsen

TABLE 1 Description of the determinants of NPLs, their proxies and a representative sample of their use in the literature

Determinant	Proxy	Sample of the literature
Credit risk	Ratio of non-performing loans (NPLs) to total gross loans	(Ghosh, 2017; Louzis et al., 2012; Salas & Saurina, 2002; Shehzad, De Haan, & Scholtens, 2010; Zhang et al., 2016)
Macroeconomic variables		
GDP growth	Annual percentage growth rate of GDP	(Beck et al., 2015; Ghosh, 2017; Kadanda & Raj, 2018; Salas & Saurina, 2002; Vouldis & Louzis, 2017)
Unemployment	Unemployment rate in year t	(Lawrence, 1995; Louzis et al., 2012; Rinaldi & Sanchis-Arellano, 2006)
Inflation	Annual average inflation rate	(Ghosh, 2017; Nkusu, 2011; Peric & Konjusak, 2017; Radivojevic & Jovovic, 2017)
Interest rate	Lending interest rate	(Beck et al., 2015; Espinoza & Prasad, 2010)
Real exchange rate	The change in exchange rate	(Beck et al., 2015; Klein, 2013)
Public debt	Gross government debt as % of GDP	(Louzis et al., 2012; Makri et al., 2014)
Institutional environment	Corruption Perception Index	(Bolisani, 2016; Boudriga, Taktak, & Jellouli, 2010; Park, 2012)
Bank-specific variables		
Bank capitalization (CAR)	$\frac{\text{Tier 1 Capital + Tier 2 Capital}}{\text{Risk Weighted assets}}$	(Ghosh, 2017; Rime, 2001; Shrieves & Dahl, 1992)
	$\frac{\text{Equity}}{\text{Total Assets}}$	(Koju, Koju, & Wang, 2018; Us, 2017)
Bank size	Natural log of total assets	(Albaity, Mallek, & Noman, 2019; Zhang et al., 2016)
Bank efficiency	$\frac{\text{Operating expenses}}{\text{Operating income}}$	(Espinoza & Prasad, 2010; Koju et al., 2018; Louzis et al., 2012; Ozili, 2019; Shehzad et al., 2010)
Bank performance	$\text{ROE} = \frac{\text{Net income}}{\text{Total equity}}$	(Louzis et al., 2012; Makri et al., 2014)
	$\text{ROA} = \frac{\text{Net income}}{\text{Total assets}}$	(Lafuente, Vaillant, & Vendrell-Herrero, 2019; Radivojevic & Jovovic, 2017; Vithessonthi, 2016)
Loan growth	Percentage growth of total loans between two consecutive years	(Peric & Konjusak, 2017; Salas & Saurina, 2002; Vithessonthi, 2016)
Bank diversification	$\frac{\text{Noninterest income}}{\text{Total income}}$	(Ghosh, 2017; Koju et al., 2018; Louzis et al., 2012; Stiroh, 2004a)
CEO compensation	The sum of salary, bonus, long-term incentive plan, other annual compensation, value of option grants, value of restricted stocks grants, value change of existing option holdings, value change of existing restricted stocks, and value change of direct equity holdings.	(Aggarwal & Samwick, 1999; John, Mehran, & Qian, 2010)
Banks' overconfidence	Cash-based or stock option-based incentives	(Ho, Huang, Lin, & Yen, 2016; Malmendier & Tate, 2008)
Corporate social responsibility (CSR)	CSR Index of a bank (e.g., FTSE4Good Global Index, EIRIS)	(Shen, Wu, Chen, & Fang, 2016; Wu & Shen, 2013)

TABLE 1 (Continued)

Determinant	Proxy	Sample of the literature
Ownership concentration	$\frac{\text{Total shares held by stake insiders}}{\text{Total shares outstanding}}$ [a]	(Berle & Means, 1933)
	Concentration based on ownership levels 10, 25 or 50%.	(Louzis et al., 2012; Shehzad et al., 2010)
Ownership identity	The identity of the major shareholder: State (Government) ownership - Institutional ownership	(Barry, Lepetit, & Tarazi, 2011; Deng, Elyasiani, & Jia, 2013; Haw, Ho, Hu, & Wu, 2010; Jia, 2009)
Industry-related variables		
Competition/concentration	Lerner Index	(Albaity et al., 2019; Leech & Leahy, 1991; Natsir et al., 2019; Ozili, 2019; Turk Ariss, 2010)
	The Boone indicator: The elasticity of profits to marginal costs	(Albaity et al., 2019; Schaeck, Cihak, & Wolfe, 2009)
	Concentration ratio: the sum of squared market share of the largest banks	(Boudriga et al., 2009; Leech & Leahy, 1991; Srairi, 2013)

[a]"Shares held by officers, directors and their immediate families, shares held by shareholders who hold more than 5% of the total outstanding shares" (Worldscope, 2007).

their repayment ability (Lawrence, 1995). This model was further extended by Rinaldi and Sanchis-Arellano (2006) to confirm Lawrence's findings. The authors suggest that default rate is highly dependent on borrowers' income and employment status. Recent studies confirm the prior findings and affirm that unemployment rate is, indeed, the main macroeconomic determinant of NPLs (Dimitrios et al., 2016; Jabbouri & Naili, 2019a; Kuzucu & Kuzucu, 2019).

5.1.3 | Inflation

Inflation is a key macroeconomic determinant of NPLs. Several studies attempted to identify the existence of a causality effect between inflation and banks' credit risk, yet no consensus was achieved (Amuakwa-Mensah et al., 2017; Ghosh, 2015; Gulati et al., 2019; Nkusu, 2011; Us, 2017). One strand of literature argues that higher inflation increases the level of NPLs. For instance, in a research conducted in Europe, Rinaldi and Sanchis-Arellano (2006) found that higher inflation erodes the real value of borrowers' income, which adversely affect their ability to service their debt obligations (Ghosh, 2015). Klein (2013) confirms the aforementioned finding through a study conducted in CESEE countries between 1998 and 2011. He provides evidence that under inflationary conditions, borrowers are more challenged to repay their debts especially in case of variable interest rates loans (Klein, 2013). These results were supported by Amuakwa-Mensah et al. (2017), Ghosh (2017) and Jabbouri and Naili (2019a).

Conversely, an opposing strand of the literature reports a negative relationship between inflation and NPLs (Makri et al., 2014; Nkusu, 2011). These studies contend that higher inflation decreases the value of outstanding debts, which improves the repayment capacity of households and firms (Nkusu, 2011). In the same vein, Khemraj and Pasha (2009) examined the Guyanese banking sector and revealed a negative link between inflation and NPLs. Their findings were explained by the increase of labour wages as inflation upsurges, which allows the sustainability of repayments. Furthermore, recent evidence from the Indian banking sector confirms that during periods of inflation, bank default risk is lowered (Gulati et al., 2019).

Other scholars report ambiguous results with regards to the impact of inflation on banks' loan quality. Kuzucu and Kuzucu (2019) argue that the impact of inflation differs from one region to another. They claim that higher inflation leads to lower NPLs in emerging countries, while an increased inflation increases NPLs in advanced countries (Kuzucu & Kuzucu, 2019). These findings were challenged by other scholars arguing that inflation has no significant impact on NPLs. For instance, Tanasković and Jandrić (2015) examined banks operating in CESEE countries between the period 2006–2013. The authors document the absence of a significant relationship between inflation and NPLs. This finding was confirmed by Peric and Konjusak (2017) who investigate NPLs' determinants in selected EU countries spanning the period 1999–2013. These opposing results make this stream of literature vague, requiring further and profound investigations.

TABLE 2 Publishing journals on the determinants of non-performing loans (NPLs)

Name of Journal	ABS ranking[a]	Number of articles
Journal of Banking and Finance	3	9
American Economic Review	4*	3
Research in International Business and Finance	2	3
Emerging Markets Finance and Trade	2	3
Journal of Financial Services Research	3	2
International Review of Financial Analysis	3	2
Finance Research Letters	2	2
Journal of Financial Stability	3	2
Borsa Istanbul Review	NR	2
Economic Modelling	2	2
Panoeconomicus	NR	1
Journal of Finance	4*	1
Accounting Research Journal	2	1
Journal of Financial Intermediation	4	1
Applied Economic Letters	NR	1
Applied Financial Economics	2	1
Economic Review	3	1
Economic Bulletin	NR	1
Economic systems	2	1
Financial Review	3	1
Emerging Markets Review	2	1
International Journal of Central Banking	2	1
International Journal of Financial Studies	NR	1
Journal of African Business	1	1
Journal of Financial Economic Policy	NR	1
Journal of Central Banking Theory and Practice	NR	1
Journal of Financial Crime	NR	1
Journal of Economics and Business	1	1
Journal of Money, Credit and Banking	4	1
Journal of International Financial Markets, Institutions and Money	3	1
Journal of International Money and Finance	3	1
Open Economies Review	2	1
Journal of Risk Finance	1	1
The Developing Economies	NR	1
Review of Development Finance	2	1
South East European Journal of Economics and Business	NR	1
Prague Economic Papers	NR	1
Review of Pacific Basin Financial Markets and Policies	2	1

[a]The journals above are ranked according to the ABS ranking report published by the Chartered Association of Business School (CABS) in 2018. 4* = journals of distinction and example of world-wide excellence. 4 = leading journals with the most original and best-executed research. 3 = high regarded journals that publish original and well-executed research, yet they may not carry a high impact factor. 2 = journals publishing original research with acceptable standards. 1 = journals publishing original research with modest standards. NR: Not rated.

5.1.4 | Interest rate

Prior literature provides compelling evidence that high interest rates impact the lending rate of banks, which results in an increased level of NPLs.[10] This policy-related determinant was first investigated by Sinkey and Greenawalt (1991) who used a sample of large commercial banks in the US between 1984 and 1987. Their findings demonstrate that an increase in interest rates leads to higher loan losses. Similarly, Berge and Boye (2007) piloted a research in Norway and found that the upsurge in bad loans is sharply explained by an increase in interest rate. Moreover, Espinoza and Prasad (2010) examined the banking sector in the Gulf Cooperation Council Countries (GCC), and claim that an increased interest rate leads to a higher lending rate, which impairs borrowers' repayment capacity due to ballooned interest payments. Several studies confirmed the role of an increased interest rate in deteriorating borrowers' repayment capacity (Beck et al., 2015; Ghosh, 2015; Us, 2017). However, other studies point out that high interest rates impact loan quality, only if the bank follows a floating-rate regime (Messai & Jouini, 2013). As a matter of fact, fixed rate loans are immune to interest rates fluctuations, hence, borrowers' capacity to honour their debt obligations remains intact.

TABLE 3 Top 20 articles listed by the number of citations according to the Web of Science

Authors, Year of Publication and Title	Journal	Country	Variable type	Sample period and research method	Citation count[a]
Hellmann et al. (2000)					
Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough?	American Economic Review	US	Bank-specific	—	523
Berger and Deyoung (1997)					
Problem Loans and Cost Efficiency in Commercial Banks	Journal of Banking and Finance	US	Bank-specific	1985–1994 Ganger-causality techniques	508
Boyd and Nicolo (2005)					
The Theory of Bank Risk Taking and Competition Revisited	The Journal of Finance	—	Bank-specific	—	468
Reinhart and Rogoff (2011)					
From financial crash to debt crisis	American Economic Review	Global	Macroeconomic bank-specific	1800–2009 Vector autoregression	318
Shrieves and Dahl (1992)					
The Relationship between Risk and Capital in Commercial Banks	Journal of Banking and Finance	US	Bank-specific	1984–1986 Two stage least square regression	224
Salas and Saurina (2002)					
Credit Risk in Two Institutional Regimes: Spanish Commercial and Savings Banks	Journal of Financial Services Research	Spain	Macroeconomic bank-specific	1985–1997 Dynamic panel–GMM models	206
Kwan and Eisenbeis (1997)					
Bank Risk, Capitalization, and Operating Efficiency	Journal of Financial Services Research	US	Bank-specific	1986–1995 Least-squares method	105
Louzis et al. (2012)					
Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios	Journal of Banking and Finance	Greece	Macroeconomic bank-specific	1993–2005 Dynamic Panel–GMM models	182
Jiménez and Saurina (2005)					
Credit cycles, credit risk, and prudential regulation	International Journal of Central Banking	Spain	Bank-specific corporate governance	1984–2002 Dynamic panel–GMM models	74
Podpiera and Weill (2008)					
Bad luck or bad management? Emerging banking market	Journal of Financial Stability	Czech	Bank-specific	1994–2005 Dynamic Panel–GMM models	67
Castro (2013)					
Macroeconomic determinants of the credit risk in the banking system: The case of the GIPSI	Economic Modelling	Europe	Macroeconomic	1997–2011 Pooled-OLS, fixed and random effects	60

(Continues)

TABLE 3 (Continued)

Authors, Year of Publication and Title	Journal	Country	Variable type	Sample period and research method	Citation count[a]
Rossi et al. (2009)					
How loan portfolio diversification affects risk, efficiency and capitalization: A managerial behavior model for Austrian banks	Journal of Banking and Finance	Australia	Bank-specific	1997–2003 Granger-causality tests	55
Hu et al. (2004)					
Ownership and Loans: Evidence from Taiwanese Banks and Non-performing Loans: Evidence from Taiwanese Banks	The Developing Economies	China	Bank-specific	1996–1999 Dynamic Panel–GMM models	52
Haq and Heaney (2012)					
Factors determining European bank risk	Journal of International Financial Markets, Institutions and Money	Europe	Bank-specific	1996–2010 Dynamic Panel–GMM models	51
Sinkey and Greenawalt (1991)					
Loan-loss experience and risk-taking behavior at large commercial banks	Journal of Financial Services Research	US	Macroeconomic bank-specific	1984–1987 Long linear regression model	56
Ghosh (2015)					
Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states	Journal of Financial Stability	US	Macroeconomic Bank-specific	1984–2013 Fixed effects and GMM estimators	51
Sullivan and Spong (2007)					
Manager wealth concentration, ownership structure, and risk in commercial banks	Journal of Financial Intermediation	US	Bank-specific	1990–1994 Ordinary least square regression	49
Zhang et al. (2016)					
Non-performing loans, moral hazard and regulation of the Chinese commercial banking system	Journal of Banking and Finance	China	Bank-specific	2006–2012 Threshold panel regression model	33
Beck et al. (2015)					
Key Determinants of Non-performing Loans: New Evidence from a Global Sample	Open Economies Review	Global	Macroeconomic	2000–2010 Dynamic Panel Methods	26
Dimitrios et al. (2016)					
Determinants of non-performing loans: Evidence from Euro-area countries	Finance Research Letters	Europe	Macroeconomic bank-specific	1999–2005 Dynamic Panel–GMM models	24

[a]Citation count as of January, 2020 according to web of science database, excluding self-citations.

Note: We conducted a citation count using Google Scholars and found similar results. However, to avoid self-citations and ensure reliability only Web of Science citations counts are reported.

5.1.5 | Real exchange rate

Theoretically, if a currency depreciates, it loses its value compared to one or more foreign reference currencies. In fact, the unforeseen movement of currencies can be a significant source of risk and uncertainty. In this sense, the banking literature attempted to investigate the impact of real exchange rate on the banks' credit risk, considering banks as ones of the most exposed financial institutions to the fluctuations of exchange rate. Yet, this relationship remains ambiguous.

Beck et al. (2015) underline the significant and negative impact of exchange rate depreciations on banks' loan quality. The study highlights that the effect of depreciation becomes more crucial in countries with a widespread currency mismatch (Beck et al., 2015). In addition, it was argued that banks located in countries with high portions of private sector debts dominated in foreign currencies suffer greater NPLs shocks (Beck et al., 2015; Espinoza & Prasad, 2010). The authors explain this relationship by the negative effect of the so-called balance sheet channel, where unhedged borrowers with debt dominated in foreign currency incur higher debt servicing costs in local terms, which, thus, increases the chances of non-repayment. Policymakers and government authorities should, therefore, be aware of the importance of foreign exchange reserves in preventing these economic shocks if any exchange rate begs slump occurs (Beck et al., 2015).

On the other hand, other scholars claim that a positive relationship exists between real exchange rate and NPLs (Klein, 2013). For instance, Klein (2013) investigated 16 CESEE countries between 1998 and 2011. He found that, in countries with high export volumes and insignificant currency mismatches, exchange rate depreciation reduces the level of NPLs. He supports his findings using the notion of "the competitiveness channel." This view suggests that a depreciation in the local currency strengthens export activities, which would improve the financial position of firms and enhance their capacity to pay (Klein, 2013).

5.1.6 | Sovereign debt

Sovereign or public debt has revived the interest of researchers due to its far-reaching effects on the economy. Its importance arises, remarkably, after the European sovereign debt crisis in 2009. To clarify the link between public debt and the banking sector downturns, Reinhart and Rogoff (2011) investigated 290 banking crises and 209 sovereign default episodes in 70 advanced and emerging countries between 1800 and 2009. The authors revealed a strong link between the two economic events, arguing that banking crises are often signalled by sovereign debt crises (Reinhart & Rogoff, 2011). Until today, there is one school of thought that provides a compelling evidence about the positive association between public debt and NPLs. In fact, higher public debt may lead to an increase in taxation which impacts the financial position of individuals and firms (Perotti, 1996). Worse then, it cuts the public spending leading to a drop in social expenditure and wages (Perotti, 1996). This may result in higher bad loans due to the negative effect on household income which, in turn, retards debt repayment. In addition to that, there is ample evidence that public debt deteriorates the public finance, which negatively impacts the creditworthiness of national banks by placing a "sovereign ceiling" on their solvency (Reinhart & Rogoff, 2011). Consequently, banks confront higher liquidity issues and become hard-pressed to raise market financing. In this context, banks are required to reduce their lending which thus, erodes the capacity of borrowers to refinance their debts (Reinhart & Rogoff, 2011). Subsequently, scholars were strongly influenced to further confirm or reject this relationship—that, at first sight, does not appear to be directly linked to banks' credit risk. Louzis et al. (2012) formulated this idea, which purports that an increase in fiscal deficit leads to higher NPLs, into the "sovereign debt hypothesis." Several studies followed to test the validity of this hypothesis. Using dynamic panel models, these authors tested and confirmed this hypothesis in a study conducted on the nine largest banks in Greece between 2004 and 2009. In the same vein, Makri et al. (2014) examined banks of 16 European countries between 2000 and 2008. Their results support the "sovereign debt hypothesis" and suggest that debt deficit problems lead to higher NPLs. Likewise, Ghosh (2015) investigated this relationship in the largest commercial and saving banks across 50 American states between 1984 and 2013. He confirmed that as government's public debt decreases, banks' loan quality improves, which endorses the "sovereign debt hypothesis."

5.1.7 | Institutional environment

It is remarkable that, despite the importance of the country-level institutional environment, research has so far paid little attention to its role in shaping banks' risk-taking. Various studies contend that a favourable institutional environment enhances credit quality through better control of corruption, sounder regulatory frameworks, and greater accountability (Boudriga et al., 2010). In fact, corruption was reported to be one of the main factors behind the financial crisis (Park, 2012). Corruption in the banking sector occurs when firms need to secure credits by bypassing loan review or when a bank needs regulatory forbearances (Park, 2012). Furthermore, borrowers might corrupt bank officers to speed their loan processing or ease

their loan access, which might result in higher NPLs due to poor loan screening and insufficient loan documentations (Park, 2012). In a study that comprises 22 countries and covers the period between 2008 and 2012, Bolisani (2016) confirms the positive association between corruption and NPLs. The author finds that corruption deteriorates banks' loan quality in emerging markets, preventing a proper-functioning of the banking sector and thus, a sustainable economic growth (Bolisani, 2016).

5.2 | Review of unsystematic factors

5.2.1 | Bank-specific factors

The relationship between bank-specific factors and the emergence of NPLs was the focus of a significant number of studies. Banks' internal factors may have a significant influence on the level of NPLs. The underneath factors are the much-noticed in the literature.

Bank capitalization

In 1988, the first Basel Accord was established to set minimum capital requirements for banks and impose constraints on the use of their financial leverage with the aim of minimizing credit risk. In this sense, the capital requirement, measured by the bank's capital adequacy ratio (CAR, hereafter) and used universally by regulators, determines the portion of equity that banks need to set aside as a buffer against excessive risk exposures (World Bank, 2006, p. 23).[11] This impinged capital was mainly designed to protect creditors and depositors and insure the stability of the banking system (Koehn & Santomero, 1980). Numerous studies examined the impact of capital requirements on banks' risk attitudes.

First, Shrieves and Dahl (1992) studied a large sample of US banks over the period between 1984 and 1986. The authors contend that the capital held as a proportion of banks' risk-weighted assets impacts largely banks' risk-taking, given that undercapitalized banks usually raise their capital in response to additional risk exposure (Shrieves & Dahl, 1992). The rationale behind the negative link between CAR and NPLs is that banks with greater amount of capital at risk are more likely to engage in prudent lending with ample loan screening to sustain the capital they set aside (Sinkey & Greenawalt, 1991). The opposite is true, thinly capitalized banks will probably engage in optimistic risk-taking which, in turn, escalates their NPLs. These results were supported by various other studies. For instance, in their seminal paper that covered 107 countries, Barth, Caprio, and Levine (2004) argued that banks with low CARs tend to engage in riskier lending practices to increase their profits. Besides, Boudriga et al. (2009) approve this negative relationship using data from 59 countries between the period 2002–2006. They argued that higher capital adequacy ratio improves banks' loan quality by preventing them from excessive risk-taking. Furthermore, the moral hazard hypothesis, developed by Keeton and Morris (1987) provides further explanation for this CAR-NPLs association. The hypothesis was examined in an influential study that comprises 2,460 commercial banks in the US between 1979 and 1985.[12] In this context, managers in thinly capitalized banks engage in riskier activities given the limited loss they may incur in a potential breakdown, which justifies a higher level of NPLs (Berger & Deyoung, 1997). Salas and Saurina (2002) and Us (2017) provided additional empirical evidence that corroborates the latter relationship.

Conversely, other pieces of literature support opposing views, which argue that CAR is statically and positively linked to NPLs. Exploring the effect of CAR on the quality of loans, Ghosh (2017) contends, based on a sample of 100 US commercial banks over the period between 1992 and 2016, that banks with high CAR experience larger loan losses. The author attributes this result to the high regulatory capital that encourages banks to engage in risky activities. Thus, an excessive risk-taking translates into a higher level of bad loans (Koehn & Santomero, 1980). This view was later confirmed by Kim and Santomero (1988) who used a mean–variance model to investigate the role of capital requirements on banks' risk control. Similarly, Rime (2001) examined Swiss banks and confirm that CAR is positively linked to credit risk. In fact, banks with high regulatory capital are more likely to engage in liberal credit policies with a lack of prudence when it comes to risk assessment (Ghosh, 2017).

This relationship is still considered an area, at the moment, of substantial ambiguity. Still, these conflicting results raise the importance of CAR as a fundamental determinant of NPLs that requires a specific attention from central banks while designing regulatory policies.

Bank size

Bank size is another determinant of NPLs that has been frequently examined given that the behaviour of larger banks differs, noticeably, from smaller ones. No clear-cut evidence has been yet found in the literature regarding the effect of bank size on credit risk.

One strand of the literature argues that bank size is negatively linked to NPLs (Alhassan, Kyereboah-Coleman, & Andoh, 2014; Hu, Li, & Chiu, 2004; Salas & Saurina, 2002). According to this view, large-sized banks are in a better position to conduct proper loan screening to assess borrowers' creditworthiness and cope with defaulters given their modern risk management systems and procedures (Louzis et al., 2012; Salas & Saurina,

2002; Solttila & Vihriâlâ, 1994). It is, also, argued that bigger banks tend to devote more resources to loan evaluation and analysis, which dissuades them from extending credits to low-quality borrowers (Hu et al., 2004). Contrariwise, due to their limited resources, small-sized banks with moderate risk management tools struggle to cope with defaulters which escalates their NPLs. Besides, the diversification hypothesis formulated by Louzis et al. (2012), postulates that large-sized banks exhibit low NPLs as they tend to be more diversified compared to their smaller counterparts.

In contrast, some banks might fall into "the too big to fail" trap, considering that they are indispensable and start engaging in irresponsible lending practices. In fact, the "too big to fail" hypothesis (TBTF) suggests that the big banks that play a vital role in the nation's financial system and whose failure would jeopardize the stability of the whole economy, are tempted to undertake excessive risk, believing that they will be bailed out by the government in case of failure (Stern & Feldman, 2004).[13] This hypothesis was confirmed by Louzis et al. (2012), arguing that larger banks would increase their leverage and take excessive risk, which will reduce the quality of their loan portfolios. Also, the positive relationship between bank size and NPLs was further explored in a study that covered 15 European countries between 1996 and 2010, confirming that large-sized banks, mostly protected by the government, are more likely to engage in riskier lending practices as they do not shoulder the full burden of their decisions (Haq & Heaney, 2012).

Bank efficiency

There is an abundant amount of literature that addresses the association between cost efficiency and bad loans, yet the results are obscure. The influential paper of Berger and Deyoung (1997) was one of the earliest to shed lights on this relationship. Their work consisted of investigating a large sample of US commercial banks between 1985 and 1994. The authors tested three major hypotheses related to cost efficiency, that are, until today, still examined and revisited by researchers globally.[14] The details of each hypothesis will be provided below.

First, the "bad management hypothesis" postulates that low cost-efficient banks usually incur higher levels of NPLs due to their managers' poor managerial skills (Berger & Deyoung, 1997). That is, under this hypothesis, the subpar managers in these banks may exhibit poor credit scoring, inadequate collateral evaluation or/and low borrower monitoring, which result in the relapse of the bank's balance sheet (Berger & Deyoung, 1997). The opposite is true, managers in cost-efficient banks with adequate and wise management skills are more likely to reduce the level of bad loans. Podpiera and Weill (2008) who applied GMM dynamic panel estimator on a sample of Czech banks to extend the preceded work of Berger and Deyoung (1997), provide strong evidence in favour of this hypothesis. In the same sphere, this hypothesis was further supported by Espinoza and Prasad (2010), Louzis et al. (2012) and Dimitrios et al. (2016), arguing that cost inefficiency is a straight sign of poor management resulting in an accumulated level of NPLs.

The second hypothesis that negatively links cost efficiency to NPLs is the "bad luck" hypothesis (Berger & Deyoung, 1997). This latter implies that due to unexpected external events such as a decrease in GDP, an economic slowdown, and so forth, banks might incur higher NPLs. This results in additional managerial efforts and extra operating cost to deal with these bad loans, which, in turn, deteriorates banks' cost efficiency (Berger & Deyoung, 1997; Podpiera & Weill, 2008).[15] This hypothesis was tested and confirmed by other scholars such as Rossi et al. (2009).

The third hypothesis dubbed as the "skimping hypothesis" provides an opposing view to the aforementioned results. It connects the quality of a bank's loan portfolio to the costs devoted to monitoring and underwriting. That is, this hypothesis insinuates that banks which devote limited resources to conduct proper credit underwriting and monitoring are more cost efficient in the short run, yet they will probably face a burgeoning level of NPLs in the long run (Louzis et al., 2012). Thus, the role of credit underwriting is prenominal. In this light, a study used a dynamic panel data model across large Australian banks between the period 1997–2003 argues that banks who devote necessary resources to credit underwriting, risk control and monitoring have better chance to evade bad loans (Rossi et al., 2009).

Bank performance

A large body of literature attempted to address the connection between banks' performance and bad loans. Scholars have particularly investigated whether the lagged profitability, as a proxy for performance, impacts the level of NPLs. Profitable banks allude higher desire for growth and a solid buffer against shocks, which, in turn, should lower their NPLs. From this perspective, Louzis et al. (2012) hypothesize that lagged profitability is negatively linked to NPLs, and formulated the "bad management hypothesis" to explain this relationship. They assert that low profitability may denote poor management skills and capabilities with respect to lending strategies. Ghosh (2015) supports this idea and suggests through his research conducted on 50 US states between 1984 and 2013, that higher profitability lessens banks' NPLs. He adds that profitable banks are less inclined to undertake excessive risk, which increases the quality of their loan portfolios. Additionally, using aggregate data

on a panel of 14 European countries between 2000 and 2008, a study documents that in order to compensate from preceding losses, less profitable banks engage in riskier lending activities which further escalates their NPLs (Makri et al., 2014).

In rebuttal, other scholars found that high profitability increases NPLs. For instance, Rajan (1994) contends that profitability can harm loans' quality as the bank alters its credit policy. In other words, banks can manipulate the market by their superior credit evaluation capabilities through concealing the level of their bad loans. This can be achieved through the extension of the terms of credits, renewal of borrowers' credit lines so that insolvent borrowers won't be recognized as defaulters and weakening covenants to limit defaults. The aim of this policy, dubbed as the liberal credit policy or the negative NPV extension of credits, is to boost up-front fees so that current earnings escalate (Rajan, 1994). Nevertheless, this high-risk policy may result in higher NPLs and heavy future losses (Louzis et al., 2012). Besides, García-Marco and Robles-Fernández (2008) provide evidence, from the Spanish banking industry between 1993 and 2000, that links profit-maximizing policies to higher level of risk. The findings of this research confirm the positive relationship between profitability and NPLs, arguing that a poorly performing bank will more likely engage in prudent lending activities through the adoption of a conservative credit policy to limit further losses. Thus, it comes as no surprise that profitability is a crucial factor that determines the level of NPLs, but with indecisive points of view in the literature about the direction of its effects.

Loan growth

Economists and academicians have always wondered if banks can grow without increasing their riskiness (Foos, Norden, & Weber, 2010). Indeed, while looking for the factors triggering the subprime financial crisis, empirical research found good reasons to believe that rapid loan growth was a major predictor of banking failures (Jin, Kanagaretnam, & Lobo, 2011). Against this background, scholars have narrowed down the topic to examine the relationship between credit growth and credit risk. One of the earliest studies in this area was instigated by Keeton and Morris (1987) who studied a sample of 2,470 banks in the US between the period 1978–1985. The authors associate rapid credit growth to riskier lending behaviours. They remark that when banks shift their supply, loan screening standards are reduced and thus, loan quality deteriorates (Keeton & Morris, 1987). Keeton (1999) further argued that in the search for an extended credit portfolio, banks will either reduce the charged interest rates or lower their credit standards.[16] Foos et al. (2010) report compelling results when investigating 16 countries between 1997 and 2007. In fact, given that the losses on inadequately granted loans may not be realized promptly, banks may be interested in increasing short-term profits through easing credit standards, but at the expense of heavy futures losses.[17] Salas and Saurina (2002) joined the previously mentioned results after conducting a study on a sample of Spanish banks between 1985 and 1997. They document that credit expansion is one of the direct causes of bad loans. This positive relationship can be approached from different perspectives. First, an increase in loan growth could overwhelm the resources that banks dedicate to underwriting and screening, which results in insufficient risk analyses and, therefore, an increased probability of default (Solttila & Vihriâlâ, 1994). Second, banks that desire to increase their market share will usually face substantial challenges due to the adverse selection problem (Salas & Saurina, 2002). Put differently, banks commit great efforts and devote supplement resources to keep their high-quality borrowers but will "release" customers whose creditworthiness is doubtful. Thus, when other banks expand the supply of their credits to new sectors or geographic areas, adverse selection will increase as the riskiest customers will be the first to visit the new entrant banks, those in whom the incumbent banks are less interested (Salas & Saurina, 2002). Third, in case of agency problems, managers would more likely seek rapid credit expansion and take excessive risk in the sake of a bigger market share, usually tied to higher promotion, strong status and greater power (Salas & Saurina, 2002). This positive relationship was, also, supported by Kwan and Eisenbeis (1997) and Alhassan et al. (2014).

Contrariwise, Boudriga et al. (2010) contend that higher loan growth leads to an improved loan quality, arguing that banks who focus on credits as their core activity are more likely to have effective risk analysis mechanisms to cope with defaulters. In this vein, a recent research investigated a sample of 98 banks in 10 MENA countries during the period between 2003 and 2016, found that loan growth has a negative yet, insignificant relationship with NPLs (Jabbouri & Naili, 2019a).The authors explained the negative sign by the crowding-out effect that took place in the MENA region during the period of the study, precluding risky firms and individuals from obtaining loans, which lowers the build-up of NPLs.[18] Other researchers assert that credit growth does not statically impact the level of banks' bad loans (Klein, 2013; Makri et al., 2014; Vithessonthi, 2016).

Diversification

Prior literature suggests that banks' diversification exercises a significant influence on the banks' level of NPLs. The studies that document a positive impact of

diversification on banks' risk behaviour, argue that diversified banks can benefit from economies of scopes and reduce risk through spreading fixed costs over a multiple range of products. On the other hand, Stiroh (2004a) studied US banks on a large period between 1970 and 2001. He contends that banks' diversification does not principally lead to risk reduction, a result already approved by DeYoung and Roland (2001). In fact, several studies have shed lights on how banks' diversification affects banks' profitability and insolvency, but little attention was given to its direct association with credit risk. Nevertheless, the limited number of studies that examined the link between diversification and credit risk found interesting results. For instance, Louzis et al. (2012) claim that diversification, proxied by noninterest income, negatively affects NPLs. This can be explained by the "dark side" of diversification which postulates that banks who enter into new businesses in which they have little experience and limited comparative advantage, are more likely to fail and face excessive risks (Louzis et al., 2012; Stiroh, 2004b). Compelling results were found using a sample of Chinese banks between 1997 and 2012, confirming that diversification only brings additional risk (Zhou, 2014). These results have been documented in an early study by Boyd and Graham (1986), who assert that diversification increases the likelihood of banks' failures especially during periods of deregulation.

Managerial factors

Executive compensation policy in the banking sector has been a central focus of the global financial debates as it serves as a mechanism that reduces agent-principal conflicts and the riskiness of the firm (Jensen & Meckling, 1976; Shleifer & Vishny, 1986). In the aftermath of the 2007–2008 financial crisis, the public and academic interest in executive compensation has increased considerably, accusing this latter for being one of the reasons behind the excessive risk-taking that triggered the financial crash (John et al., 2010; Vallascas & Hagendorff, 2013). Since then, this topic has received considerable regulatory scrutiny based on a view that associates CEO compensation to higher risk-taking.[19] In this sense, it was argued that as option-based compensation increases, CEOs' risk aversion escalates (Ross, 2004). Under such circumstances, CEOs will more likely take safe investment decisions to preserve their personal wealth portfolios. Consistent with this, and as incentives are received only in a state of solvency, they can encourage executives to avoid bankruptcy through lowering their risk preferences and making conservative investment decisions (Brander & Poitevin, 1992; John et al., 2010). On the other hand, to contribute to the on-going debate, another study investigated a large sample of US and European banks, claiming that as executive compensation increases in risky banks, managerial risk-taking intensifies (Vallascas & Hagendorff, 2013). One such argument goes that, instead of lowering risk-taking, compensations reward bank managers for taking excessive risk to achieve their targeted performance goals (Chen, Steiner, & Whyte, 2006; Vallascas & Hagendorff, 2013). An impressive body of literature has, indeed, shed lights on the impact of CEO compensation on banks' risk-taking, yet its direct impact on credit risk, denoted by banks' NPLs is clearly missed. Further analyses of this impact would be of vital significance to market participants, banks' board of directors and policymakers.

Another important managerial trait that participated in the credit market freeze of 2007–2008 is banks' overconfidence. At the height of the housing bubble and during the unprecedented and rapid credit expansion in the US, banks lend aggressively to nearly anyone capable of signing on the dotted line. This eager lending resulted in the bankruptcy of several financial institutions due to the ballooned amounts of NPLs. The literature suggests that banks' overconfidence might have some part to play. Since managerial overconfidence directly influences decision-making, several studies examined its impact on banks' risk-taking behaviours.[20] To empirically investigate this interesting relationship, a study collected data from US banks spanning the period between 1994 and 2009 and employed stock options-based proxy for CEO overconfidence (Ho et al., 2016). The authors found that overconfident managers undertook excessive risks through relaxed lending standards and an increased bank leverage which, in turn, lead to the creation of an overheated economy with high levels of NPLs (Ho et al., 2016). In fact, the empirical study shows that most of the loans granted by overconfident managers in non-crisis years were in default, making their banks more vulnerable to economic shocks. This result supports the claim that overconfidence reduces managers' risk aversion and makes them less conservative in making investment choices (Gervais, Heaton, & Odean, 2011). These managers tend to underestimate the risks, which leads to large wealth losses and burgeoning levels of NPLs (Malmendier & Tate, 2008). Thus, a high level of CEO overconfidence is detrimental given the accompanied excessive risk exposures. In rebuttal, other arguments suggest that overconfident managers often overvalue the benefit of learning about risky investment projects and exert more efforts than non-confident managers (Gervais et al., 2011). Geanakoplos (2010), among others, claims that overconfident banks are more prone to take excessive risk, which can be rewarding, but only during economic booms. These conflicting arguments make the question of whether overconfidence in the banking sector

impacts the level of NPLs a heatedly debated issue that requires further and profound investigations.

Corporate Social Responsibility (CSR)

The topic of corporate social responsibility (CSR, hereafter), has been and remains a constant debate. It has been characterized as "an inescapable priority of business leaders in every country"(Porter & Kramer, 2006). This responsibility mirrors the attention banks attach to integrating environmental, social, corporate governance and consumer concerns into their core strategy.[21] In fact, since its appearance, academicians and researchers have never ceased investigating its effect on the performance of firms. Yet, its impact on the riskiness of financial firms, especially banks has not been well documented in the literature. In fact, empirical studies examining the direct CSR-NPLs link are scant. The few studies that shed lights on this topic, relate CSR to bank reputation (Bushman & Williams, 2012; Chemmanur & Fulghieri, 1994; Shen et al., 2016). These studies claim that socially responsible banks are more likely to enjoy a decent reputation and acquire a higher sense of trust from their customers compared to banks that do not engage in CSR activities. In an empirical study, Bushman and Williams (2012) found that high-reputation banks record superior loan quality in the three years subsequent to the loan initiation. These results are explained by the rigorous monitoring conducted during the term of the loan (Bushman & Wittenberg Moerman, 2012). Confirming prior results, a study conducted on a sample of US banks during the period between 2003 and 2009 argues that socially responsible banks incur lower NPLs (Wu & Shen, 2013). In the same spirit, another research used CSR data from 18 countries between 2000 and 2009 documents a significant and negative relationship between CSR and NPLs, and contends that CSR banks outperformed non-CSR banks in terms of loan quality (Shen et al., 2016). The authors claim that borrowers prefer high-reputation banks that engage in CSR practices, regardless of the interest rates charged (Kim, Lee, Lee, & Kim, 2010). The willingness to be associated with high-reputation banks mirrors the creditworthiness these borrowers engender along with their sense of trust (Sen & Bhattacharya, 2001). Given the scarcity of research tackling the CSR–NPL relationship, future research could yield valuable insights.

Ownership structure

The topic of corporate governance has been considered as a controversial one. The BCBS has dedicated remarkable efforts to enhance banks' corporate governance as it differs from non-financial firms in terms of regulation, business complexity and transparency and because it contributes significantly in reducing risks and boosting investors' sentiments (Mehran, Morrison, & Shapiro, 2011).[22] On the other hand, poor corporate governance has been blamed as a contributory factor in the onset of the recent financial slump as it induces banks to undertake excessive risk (Dong, Meng, Firth, & Hou, 2014). In fact, there is a widespread recognition that ownership structure is one of the crucial mechanisms of corporate governance, reflecting firms' value and the quality of investors rights' protection (Bebchuk, Cohen, & Ferrell, 2009; Connelly, Limpaphayom, & Nagarajan, 2012). In this sense, several research studies contributed to the banking literature by studying the impact of the identity of the controlling shareholders and the extent of their ownership on banks' risk-taking behaviours (García-Marco & Robles-Fernández, 2008; Laeven & Levine, 2009; Louzis et al., 2012; Shehzad et al., 2010, among others). Understanding the impact of ownership structure on bank risk tolerance is significantly important to shape the banking sector operations and to help restructuring the on-going reforms and regulations in the financial market (Haw et al., 2010). The intellectual debate on ownership structure has contributed to the emergence of several points of view that, until today, have not been decisive.

Ownership concentration. The finance literature has suggested different explanations regarding the effect of ownership concentration on banks riskiness. The early research that explored this relationship found that under dispersed ownership, firms lack shareholders monitoring of management (Berle & Means, 1933). This long-standing view suggests that controlling owners, with greater power, mitigates agency problems. By the same token, Shleifer and Vishny (1986) argue that when shareholders lack controlling power, they show little incentives to conduct proper monitoring of the firm, but when large shareholders bear the cost of shrinking, the monitoring of management is enhanced. This idea was supported by Burkart, Gromb, and Panunzi (1997) who, also, declare that dispersed ownership constitutes a threat that leads to relaxed monitoring and control procedures. In the same line of research, it was evidenced by an empirical study conducted on a sample of 267 US banks during the period between 1991 and 1994, that large shareholders with strong financial commitment reduce bank risk exposures through the adoption of safe and sound lending policies (Sullivan & Spong, 2007). In the same line, an influential study tested the traditional Berle-Means position using a sample of 500 banks from over 50 countries spanning the period between 2005 and 2007. The authors argued that ownership concentration significantly reduces banks' NPLs (Shehzad et al., 2010).[23] The authors add that concentrated ownership

leads to an enhanced capital adequacy because when there is one controlling owner, proper and prudent lending is more likely to be conducted, reducing the rate of non-repayment. However, under dispersed ownership, owners do not bear the full consequences of their actions, which increases moral hazard problems and results in higher loan problems. The relationship between ownership concentration and NPLs was as well tested and confirmed in the MENA region using a sample of 10 participative banks (Srairi, 2013). The results of this study illustrate that as ownership concentration upsurges, banks' loan quality improves. Although these results have important contributions to the banking literature, their validity on conventional banks remains uncertain, given the different business models of participative and conventional credit institutions. Furthermore, Leech and Leahy (1991) investigated the Chinese banking sector during the period between 1997 and 2004, arguing that ownership concentration plays an important role in reducing the probability of borrowers' default. These results were supported by recent research such as Us (2017) and Jabbouri and Naili (2019a, 2019b) who conclude that higher ownership concentration enhances the governance environment of firms and serves as a barrier against excessive risk-taking.

On the other hand, other studies contributed to this controversial debate and document a positive link between ownership concentration and banks' risk appetite. For instance, a study provided empirical evidence about the link between ownership concentration and banks' riskiness, employing data from 279 banks over the period 1996–2001 (Laeven & Levine, 2009).[24] It documents that the existence of a large shareholder leads to greater risk-appetites, given that a controlling owner has more power to affect bank risk-taking and induce managers to behave imprudently (Laeven & Levine, 2009). Another argument claims that under dispersed ownership, managerial incentives and non-contractible investments are reduced (Burkart et al., 1997). Moreover, the existing literature provides evidence that tight ownership control is linked to higher risk-taking, as the bargaining problems due to the existence of many small shareholders might lead to inefficient decision-making (Gomes & Novaes, 2000). An equally compelling view states that controlling owners with great power may prioritize their own interests at the expense of minority shareholders' interests, tunnelling the firm's resources and increasing its riskiness (Shleifer & Vishny, 1986). In fact, it is more apparent that these large owners may influence the firm's corporate decisions in a way that favours their personal agendas (Gomes & Novaes, 2000). Consistent with this view, Haw et al. (2010) conducted an in-depth investigation on the link between concentrated control and banks' soundness indicators using a sample of large banks from 22 countries between 1990 and 1996. The authors found that compared to widely held banks, banks with concentrated control exhibit poorer performance, lower cost efficiency and higher risk-taking (Haw et al., 2010). Louzis et al. (2012) corroborate the previous results and argue that when ownership concentration increases, loans quality weakens.

Ownership Identity. An important stream of the literature suggests that banks' risk-appetite is influenced by the identity of the bank's ultimate owner (Barry et al., 2011; Cornett, Guo, Khaksari, & Tehranian, 2010; Dong et al., 2014). Indeed, when it comes to state-owned banks, there are ample empirical evidences that link state ownership to high risk-taking and poor performance. Given their direct exposure to crisis, state-owned banks can be deleteriously affected in case of political or economic crisis, leading to the corrosion of their economic development and growth (La Porta, Lopez-De-Silanes, & Shleifer, 2002). Besides, it has been underlined that state-controlled banks have higher default risk and poor loan quality compared to private-owned banks (Berger, Clarke, Cull, Klapper, & Udell, 2005; Iannotta, Nocera, & Sironi, 2007). First, the senior officers and the board of directors in state-owned banks are usually appointed by the government, implying their willingness to engage in projects with high social and/or political returns but with, possibly, higher risks (Shleifer & Vishny, 1986). Unlike institutional banks who are more likely to oppose political interferences, state-owned banks are seen as vehicles for raising capital and transferring resources to finance their politically favoured groups or state-owned enterprises (Clarke, Cull, & Shirley, 2005). Furthermore, some authors claim that state-owned banks demonstrate weaker monitoring capabilities compared to institutional ones, given that their senior officers do not, usually, shoulder the consequences of their practices and, are more likely to believe that in case of a financial downturn, they will be bailed out by the government (Dong et al., 2014; Jia, 2009). Subsequently, these managers will less likely comply with prudent risk management and lending policies (Clarke et al., 2005; Jia, 2009). For instance, the Chinese State Council has intervened in favour of the Big Five state banks in China by transferring around 1,245 billion Yuan worth of NPLs to asset management firms (Okazaki, 2007). This does not only induce banks to take excessive risks, but it negatively influences borrowers' willingness to repay their debts in the long term, assuming that the government will unavoidably cover any future loan losses. In addition to that, it was argued that the senior managers of banks under a state ownership might neither face the threat of

losing their jobs in case of poor performance nor are subject to performance-based pay. Instead, their rewards depend on how they respond to government's instructions with less attention on value creation (Chen, Firth, & Xu, 2009). This implies that these managers are less likely to conduct effective monitoring compared to those in privately-owned banks, whose rewards are usually tied to the bank performance (Clarke et al., 2005).

The second type of ownership is institutional ownership, which became an important block of identity in various financial markets around the globe.[25] Both, developed and emerging countries witnessed a significant increase in the number of institutional investors.[26] Several studies have considered the effects of institutional ownership on bank performance yet, a notable lapse was related to studies linking institutional ownership to the level of NPLs. The few studies that enlighten this relationship documented a negative association between institutional ownership and NPLs (Barry et al., 2011; Deng et al., 2013; Sheshinski, 2003). In fact, a large stand of literature emphasizes on the importance of institutional owners in monitoring the firm and reducing agency problems (Shleifer & Vishny, 1986). Given the resources invested, institutional owners act as shareholders activists and are more likely to conduct proper monitoring to maximize banks' value (Shleifer & Vishny, 1986). For instance, a study conducted in the US argued that institutional ownership reduces banks' risk, because institutional investors have to abide by the prudent investor rule (Deng et al., 2013). Besides, these investors usually diversify and reduce risk to maintain a decent and long-term reputation in the capital market (Deng et al., 2013).[27] Furthermore, banks with controlling institutional owners are more likely to reduce information asymmetry problems along with the number of defaulters, as they are well armed with expertise and skills in obtaining, and well interpreting borrowers' information (Barry et al., 2011). It was argued that institutional owners are more likely to have top-level managers with a decent knowledge of the banking industry, which enhances the monitoring, efficiency and the overall performance of the bank (Dong et al., 2014). Other studies point out that senior managers in institutional-led banks are profit-motivated, which require them to engage in prudent lending practices, unlike their government-owned counterparts (Sheshinski, 2003).

After reviewing the literature, it appears that it is incapable of demonstrating whether ownership structure has a decisive impact on banks risk-taking, documenting opposing results. Moreover, only few studies addressed the direct link between ownership structure and NPLs, which makes this area of study an appealing substance for future research.

5.2.2 | Industry-related factors

Competition

Bank competition is perceived by economists, market participants and academicians as an important factor for banks' growth and stability. It has gained keen interest especially after the financial crisis. This latter offered countless lessons to bank regulators and managers on how banks' competition and concentration can, either, harm or coarsen the financial sector. In fact, in the aftermath of the global financial crisis, an urgent need emerged to address the impact of competition on bank stability and, particularly its direct effect on bank risk aversion.

In an early piece of literature, Keeley (1990) developed the so-called "franchise value hypothesis" in line with the competition-fragility paradigm. This hypothesis supports the fact that as competition in the banking sector upsurges, banks demonstrate higher risk exposures.[28] In particular, it postulates that higher competition leads to lower profit margins which, in turn, decreases the discounted net value of banks leading to an increase in their risk tolerance (Keeley, 1990).[29] Hellmann, Murdock, and Stiglitz (2000) developed a model to test this hypothesis. The authors argue that competition impacts banks' franchise value as it lowers their profitability which, therefore, decreases their incentives to grant thoughtful loans.[30] That is, in a competitive banking sector, banks will engage in inconsistent risk behaviours with an increased appetite for risk, which may increase the probability of default and the level of NPLs (Hellmann et al., 2000). In this perspective, Hellmann et al. (2000) state that:

"...If markets are sufficiently competitive, the bank earns relatively little from prudent investment, but the bank can always capture a one-period rent from gambling. Thus, increased competition tends to promote gambling in the banking sector."

In addition to that, it was stated that in a market with many competing banks, bank managers are hard-pressed to increase the returns for their shareholders, which compelled them to engage in risky practices (Keeley, 1990). Thus, any adverse shock to the financial system would have dire and contagion effects on the whole interbank market, usually characterized by small banks acting as price takers (Allen & Douglas, 2000). Another argument that favours the positive relationship between bank competition and risk-taking is that in highly competitive interbank markets, adverse selection problems intensify. In such markets, borrowers can re-apply for loans after being rejected by others banks, which increases banks' screening costs and thus increases the probability of granting loans to low-quality borrowers (Broecker, 1990). Furthermore, aggressively competing banks tend to relax restrictions of loan processes to compete and increase

their market share. Whereas in a banking sector where large banks monopolize, low-quality borrowers cannot easily access to credits (Boudriga et al., 2009). These views have been approved by other scholars such as Wang (2018) who conducted a recent study using regression models on US aggregate data to estimate the impact of competition on banks' credit risk. The results indicate that in competitive markets, the level of NPLs tends to increase in the future, supporting the widely held view that banks' concentration leads to a more stable banking sector. Other scholars such as Turk Ariss (2010) and De Haan and Poghosyan (2012) corroborate the previously mentioned arguments.

On the other hand, other scholars criticized the above hypothesis, and found opposing arguments. For instance, it was documented that the financial system stability can be enhanced by interbank competition as this latter tends to lower banks' lending rates, which consequently reduces the profitability of defaults (Boyd & Nicolo, 2005). In rebuttal, concentrated banks with higher market power tend to charge higher interest rates and, due to moral hazard problems, borrowers are more likely willing to invest in risky projects (Boyd & Nicolo, 2005). This result cannot be considered as a solid argument behind high borrowers defaults, as these banks may cover some of their losses due to the high lending rates charged, yet it can explain to some extent, the high level of defaults in concentrated interbank markets (Wang, 2018). In the same vein, competition would press bank managers to minimize their credit risk through prudent lending decisions and adequate borrowers screening in order to gain advantageous risk management perception from their bank regulators and investors (Jiménez & Saurina, 2005; Ozili, 2019). In fact, the competition-fragility/stability paradigm was one of the most discussed topics in the banking literature. Several seminal studies have shed lights on how competition affects banks' stability and risk exposure, yet research is rather quiet about its impact on the level of banks' NPLs, an area that could offer bank regulators, managers and academicians new enriching insights.

6 | IMPEDIMENTS TO CURRENT RESEARCH AND AVENUES FOR FUTURE RESEARCH

Despite the extensive empirical work accomplished over the last decades, the issue of credit risk remains an unsolved line of inquiry. This critical review indicates that the determinants of NPLs are still not fully understood, which leaves ample room for critical debates. A comprehensive understanding of the underlying determinants will help policymakers and market participants design adequate credit strategies and introduce adapted regulatory and supervisory reforms to avoid this imminent threat and ensure a sustainable economic development. Against this background, this section provides avenues to guide advancement in this research field.

6.1 | Deepen the research of bank-specific variables, particularity banks' ownership structure

This review indicates that a vast amount of research is skewed towards macroeconomic and some bank-specific determinants, with little attention paid to banks' ownership structure. Ownership structure, as a vital mechanism of corporate governance, has been blamed to be a contributory factor in the onset of the recent financial slump as it induces banks to undertake excessive risk. Besides, understanding the link between NPLs and ownership structure is essential to shape the banking sector operations and restructure the on-going reforms and regulations (Haw et al., 2010). Thus, as an avenue for future research and to guide the advancement of policy making, this review suggests incorporating ownership structure while investigating the bank-specific factors that influence banks' credit risk.

6.2 | Direct research towards managerial determinants of NPLs

An important body of literature examined the role of managerial factors such as CEO compensation and overconfidence on banks' risk-taking, yet their direct link to NPLs is unclear. With regards to the importance of managerial factors, considered as signals that can mark the onset of economic downturns, we suggest deeper analyses of the impact of CEO compensation and CEO overconfidence on the level of banks' NPLs. Given that CEOs are the primary influence of banks' investment and lending policies, studying this relationship will enrich the literature and encourage the adoption of adapted regulatory and policy reforms. Furthermore, it would be interesting to explore additional corporate governance mechanisms such as, inter alia, takeovers, board independence, board size and board gender diversity.

6.3 | Deepen research on industry-related variables

The literature review devotes little attention to the impact of interbank characteristics (competition/concentration)

on the escalation of NPLs. In fact, a dominant body of research studied the effect of interbank competition on banks' total risk, yet a notable lapse was found due to the limited studies linking competition/concentration to NPLs. Given that market conditions impact banks' risk behaviours, a more granular analysis of this relationship would enhance the understanding of NPLs' determinants and empower bank managers and regulatory authorities with additional insights to prevent future loan losses.

6.4 | Further investigate the impact of regulatory and supervisory practices on banks' NPLs

In a seminal study, Barth et al. (2004) investigate the efficacy of legal, regulatory and supervisory reforms on banks' overall financial development. However, studies that address how regulatory and supervisory practices shape banks' credit risk remain considerably scarce. Boudriga et al. (2009) and Bushman and Williams (2012) are some of the few studies that examined these issues. To overcome the critical shortcomings of Basel II and in the wake of the 2007–2008 financial crisis, a new regulatory framework known as Basel III was implemented in January 2014. The Basel Committee adopted a set of measures as buffers against any external shock that may plague the financial market. In fact, the new reforms aim at promoting a more resilient banking industry. To assess the effectiveness of these new reforms and to fill the gap between policy recommendations and empirical evidence, we advocate researchers to direct their empirical research towards this topic. We particularly suggest future research to highlight the potential impacts of the new liquidity coverage ratio (LCR), and the net stable funding ratio (NSFR) on the improvement of banks' assets quality. In addition to that, close attention needs to be paid to the role of the stringency of capital requirements, discretionary loan loss provisioning, supervisory power and practices and the properties of the general contracting environment, among others. These promising paths for future research would provide insights on the effectiveness of the new regulatory and supervisory reforms, and reveal potential shortcomings.

6.5 | Extend research to different regions, particularly to emerging countries

One of the issues that needs to be brought into attention is the scarcity of research in emerging countries compared to developed ones. Not surprisingly, this review reveals that most of the research conducted in this domain focus on European countries and the United States. Statistically, 30% of the studies are conducted in Europe, 19% in the United States, 15% in Asia, 7% in the MENA region, and only 3% of the reviewed studies focused on African countries.[31] In fact, countries may differ in terms of risk management culture, legal and institutional environment, which, in turn, would impact the determinants of NPLs. This literature gap should be, then, deepened as it might bring significant insights to researchers and policymakers with new ways to address loan problems in economies where capital is usually constrained, and governments' bailout is infrequent. In particular, we promote research to be directed towards the MENA region; an important player in the global economy, that still continues to lag far behind many regions in terms of research.[32] In fact, the few studies that have addressed the credit risk issue in the MENA region analysed a limited number of factors, making this region a promising substance for research. Thus, enlarging the scope of the studied countries would enable the elaboration of different perspectives and help identify new factors that may shape the credit risk paradox.

6.6 | Promote the use of advanced econometric models

This review reveals that pooled OLS or 2SLS estimation techniques are applied quite dominantly. Given that one of the reasons behind the mixed results is endogeneity problems, we strongly suggest the application of more advanced econometric models such as the General Methods of Moments estimation (GMM) as it avoids endogeneity issues and, is considered as a powerful econometric estimation technique.

6.7 | Promote the use of qualitative research methods to examine the causes of NPLs

The current review draws attention to the paucity of qualitative research in this study field. None of the studies reviewed analyse the determinants of NPLs from the perspective of bank managers and/or regulators. It is true that the availability of data allows for more quantitative analyses, however, qualitative research in this domain (e.g., interviews, experiments, etc.), would provide a profound understanding of NPLs' determinants, and yield valuable information to policymakers. In this sense, close attention should be paid to un-quantified determinants such as the risk attitudes and preferences of bank managers, gender, CEOs education backgrounds and so forth.

7 | CONCLUSION

Empirical studies demonstrate that NPLs are used to mark the beginning of banking crises (Reinhart & Rogoff, 2011; Samad, 2012). Besides, it is difficult, if not impossible, for policymakers and regulators to design ample credit policies and escape the imminent threat of NPLs without a deep and accurate understanding of their causes (Ghosh, 2015). As a result, this would improve the identification of the banking sector vulnerabilities, inducing regulators to adopt adjusted prudential regulations. In this regard, the ambition of this paper is to provide an extensive and recent review of the literature on NPLs' determinants, providing a step towards a more holistic understanding of these latter. It revealed the key schools of thought and a wide array of theories that shaped the topic of NPLs' determinants, which would contribute to the development of this research field and provide relevant findings to researchers and academicians. It benefits these latter as it offers rich findings on NPLs' determinants from different financial markets and detects the areas in which research is silent. Besides, practitioners are likely to benefit from this extensive review as it addresses and critically discusses the relationships between variables, which will help address prejudices and improve collaboration between market participants. Finally, this review adds more to the finance and banking literature by identifying the most influential articles in the field of NPLs along with analysing the different publications patters. The critical examinations performed allowed us to identify the main barriers that impede the growth of this research field and propose promising paths for future research.

The current study provides a comprehensive review of the literature of NPLs, yet it has some limitations. The discussion of some variables can be elaborated further. In fact, some factors have been examined by only few studies. This can be explained by the fact that the discourse on the causes of banks' credit risk is fairly recent and researchers have become more interested in the topic after the global financial crisis. Future review research needs to overcome this limitation by introducing a larger sample size.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in figshare at https://doi.org/10.6084/m9.figshare.11370723.vl

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ENDNOTES

[1] This definition will be further explained in the following section.

[2] The most affected countries according the European Central Bank (ECB) are: Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain (ECB, 2017).

[3] The non-performing loans concept is well defined in the report of Commission Implementing Regulation (EU) 680/2014. Default loans and their specificities were documented in accordance with the Section 6, article 178 of the CRR. While the impairment term is the accounting term used in accordance with the IAS 39, (IFRS 9 currently).

[4] Barisitz (2011) conducted a study in ten CESEE countries: Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Russia, Serbia, Slovakia and Ukraine.

[5] According to the International Monetary Fund (IMF), NPLs encompass three categories of sub-nonperforming loans; substandard loans, doubtful loans and loss loans. Substandard loans, doubtful loans and loss loans are all credits under the category of non-performing (IMF, 2005). First, substandard loans are loans that are not excepted to receive full repayments and which interest or/and principal are more than 90 days overdue. In substandard loans, the interests are expected to be lost. Doubtful loans are credits which payment is uncertain and highly improbable, usually due from 6 months to 1 years. Loss loans are credits that are uncollected and characterized as a loss, usually due after 1 years (IMF, 2005).

[6] This step was addressed in the previous sections.

[7] The final review includes 69 articles, in which nine are working papers.

[8] The remaining studies used a global sample including countries from different regions. These studies represent 26% of our global sample.

[9] This table excludes working papers. Our sample includes five IMF working papers and one paper from each of the following financial institutions: the European Central Bank (ECB), the Bank of Guyana, the Bank of Finland and the Central bank of Greece.

[10] Interest rate or the mostly referred to as policy-rate.

[11] According to the World Bank definition, capital adequacy ratio (CAR) is the ratio of equity that a bank must hold as a percentage of its risk-weighted assets (World Bank, 2006, p. 23).

[12] This hypothesis was further investigated by Berger and Deyoung (1997).

[13] Under the "too big to fail" (TBTF) hypothesis developed by Stern and Feldman (2004), largest banks are usually protected by the government in case of collapse. These banks are more likely to accept and invest in risky projects, knowing that they would not bear the full responsibility of their lending decisions and be bailed-out by government, accordingly.

[14] Berger and Deyoung (1997) developed four hypotheses, yet only three are connected to cost efficiency. The forth hypothesis explains the relationship between capitalization and bad loans. This latter is called the moral hazard hypothesis and was discussed under the bank size paragraph.

[15] These extra costs may include, among others, supplementary monitoring of high risk borrowers to reduce further loses, cost of seizure and negotiations and re-evaluation of the value of collaterals (Monokroussos & Gortsos, 2017).

[16] Banks that seek higher loan growth are more likely willing to shift their supply, but with lower credit standards. For instance, they reduce the number of collaterals, conduct inadequate screening and/or grant credits to low quality borrowers with weak credit histories (Keeton, 1999).

[17] These banks managers are more likely to engage in "gambling resurrection" as they prioritize to maximize sort-term gains.

[18] See Jabbouri and Naili (2019a). The negative relationship between loan growth and NPLs can be explained by the crowding-out effect. Loans granted to government in the MENA region and during the period of study increased sharply, which prevents risky individuals and firms from obtaining loans. These loans were granted to finance state projects, including projects linked to the 2022 FIFA World Cup in Qatar, projects related to the accommodation of Syrian refugees in Jordan and the sharp infrastructure expansion in Dubai and Bahrain.

[19] Executive incentives can either be variable cash-based or variable equity-based compensation contracts.

[20] Overconfident banks are banks with overconfident CEOs, who usually believe that they have better skills and judgment in measuring the prospects of a successful outcome (Ho et al., 2016).

[21] Refer to Frooman (1997), Porter and Kramer (2006) and Carroll (1999) for CSR definitions.

[22] The Basel Committee on Banking Supervision (BCBS) has put enormous efforts to tackle the issue of banks' corporate governance. They have issued a guideline composed of a set of principles to enhance corporate governance practices within banks. See BCBS (2010) for further details.

[23] The study of Shehzad et al. (2010) proxied ownership by three different levels of shareholders ownership; 10, 25 and 50%. The authors found adverse effects between shareholders control and NPLs. A positive impact was documented when ownership concentration is defined at 10%. However, when banks' ownership concentration exceeds 50%, the level of NPLs is remarkably reduced.

[24] This study measures ownership structure via cash flow rights of large shareholders, assuming that as cash flow rights approached zero, the bank is presumed widely held (Laeven & Levine, 2009).

[25] Institutional ownership refers to owners that are either insurance companies, pension funds or large holdings and corporations.

[26] For instance, according to the Business Monitor International (BMI), several MENA emerging countries including, Jordan, Lebanon, Bahrain, Kuwait, Morocco and UAE have increased the efforts to encourage privatization in the banking sector by lowering the barriers to entry and increasing the attractiveness of the sector for institutional investors (BMI, 2017).

[27] This result assumes that diversification leads to a reduction in risk. Yet, it can also result in higher risk-taking, due to agency problems and the limited experience in the area in which the company aims to diversify (Deng et al., 2013).

[28] Keeley (1990) documents strong evidence on the relationship between competition and banks' risk-taking behaviours. His study demonstrates a direct association between competition and the number of banks' collapses in the US during the 1980s.

[29] The discounted net value is defined as the market value minus the book value of a bank. This value mirrors the franchise value introduced in the study of Keeley (1990).

[30] This increases moral hazard problems, which can result from different scenarios. For instance, banks might gamble by selecting risky projects that pay high returns if the gamble succeeds, but if it fails, the depositors and their insurers incur the losses. Also, it was argued that banks might use fraudulent lending such as insider lending, to extract their own personal benefits even if this leads to banks' insolvency (Akerlof, Romer, Hall, & Mankiw, 1993).

[31] The remaining subset of studies uses a global sample of countries from different regions.

[32] The MENA region is considered as an important player in the global economy and a vital contributor to the world's safe development. It heads the world in terms of oil reserve, natural gas and phosphate production.

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