Journal of
Risk and Financial Management

MDPI

Article

COVID-19 and Non-Performing Loans in Europe

John Hlias Plikas *, Dimitrios Kenourgios and Georgios A. Savvakis

Department of Economics & UoA Center for Financial Studies, National and Kapodistrian University of Athens, 10559 Athens, Greece; dkenourg@econ.uoa.gr (D.K.); gsavvakis@econ.uoa.gr (G.A.S.)
* Correspondence: johnp1@econ.uoa.gr

Abstract: This study investigates the impact of COVID-19 on the non-performing loans (NPLs) in Europe, distinguishing by European subregion, country-level prosperity, NPL type, and NPL economic sector. We utilized panel data analysis covering the period 2015Q1–2021Q4 while controlling for macro, bank-specific, and regulatory indicators. We derived that the COVID-19 deaths and the strictness of lockdown measures positively affected the NPLs, while the economic support policies exerted a negative effect. Profitable, capitalized banks fared better. The strictness of lockdown measures hindered the ability of SMEs to repay their loans, increasing their NPLs. Sectors involving physical work-related activities also experienced an increase in their NPLs. We also deduced that bank securitization and national culture significantly contributed to NPL reduction.

Keywords: non-performing loans; COVID-19; policy responses; European banking system; cultural dimensions

JEL Classification: G21; G28; I18; C33; E58

1. Introduction

The 21st century has been marked by a series of external shocks (Shehzad et al. 2020), with the COVID-19 pandemic standing out as a health-oriented shock, causing unprecedented cross-sector variances, rapid dissemination rates, and a high degree of economic uncertainty (Žunić et al. 2021; Yi et al. 2022). In response to the spread of the COVID-19 pandemic, nations implemented strict social distancing and lockdown policies (Yang and Yang 2021), which resulted in sharp declines in economic growth and enterprise earnings, particularly in the services, travel, and tourism industries (Zheng and Zhang 2021; Ceylan et al. 2020; Bassani 2021).

The economic spillovers of COVID-19 have reverberated globally, significantly impacting businesses, jobs, and incomes (Zheng and Zhang 2021; Banks et al. 2020). The banking industry, unable to evade the negative financial spillovers (Demir and Danisman 2021; Foglia et al. 2022; Shehzad et al. 2020), witnessed high levels of debt and economic imbalances, which have reduced the debtors' ability to repay their loan obligations, resulting in a potential increase in the banks' non-performing loans (NPLs) (Ari et al. 2021; Demir and Danisman 2021; Banks et al. 2020; Park and Shin 2021; Ho et al. 2023).

Preliminary research hinted that the pandemic would resemble the negative repercussions of a banking crisis (Özlem Dursun-de Neef and Schandlbauer 2021; Žunić et al. 2021), potentially resulting in a significant surge in NPLs (Colak and Öztekin 2021). Businesses with lower economic turnover were more likely to be affected due to the lockdown and closure policies, implying a potential surge in the SME NPLs (Cowling et al. 2022; Wellalage et al. 2022). While there is extensive scientific research on the effects of the COVID-19 pandemic on NPLs, predominantly focusing on the European Union due to its peculiar reaction to the European sovereign debt crisis (Foglia et al. 2022; Demir and Danisman 2021; Duan et al. 2021; Rizwan et al. 2020; Ari et al. 2020; Ari et al. 2021; Colak and Öztekin

check for updates

Citation: Plikas, John Hlias, Dimitrios Kenourgios, and Georgios A. Savvakis. 2024. COVID-19 and Non-Performing Loans in Europe. *Journal of Risk and Financial Management* 17: 271. https://doi.org/10.3390/jrfm17070271

Academic Editors: W. Brent Lindquist and Svetlozar (Zari) Rachev

Received: 18 May 2024
Revised: 14 June 2024
Accepted: 21 June 2024
Published: 28 June 2024

2021; Park and Shin 2021; Özlem Dursun-de Neef and Schandlbauer 2021; Apergis 2022), there still exist unexplored avenues in this area of study.

Examining the impact of COVID-19 on NPLs within Europe is of intrinsic significance due to the continent's diverse subregions, each with distinct economic structures, levels of prosperity, and policy responses. These subregional variations suggest that the impact of COVID-19 on NPLs could differ markedly across Europe, with peripheral economies experiencing more severe impacts due to their economic vulnerabilities (Foglia et al. 2022; Apergis 2022). For instance, in 2015, while the average NPL ratio across the Eurozone was approximately 12%, Germany had an NPL ratio of less than 2%, whereas Greece faced a staggering 35%, and Italy and Ireland had ratios of around 20% (Rinaldi and Sanchis-Arellano 2021). This highlights the stark contrast between core economies, such as Germany, and peripheral economies, such as Greece and Italy (Jameaba 2020). Moreover, the interconnected economies underscore the potential for cross-border repercussions, emphasizing the need for a localized study. Europe's historical responses to crises, such as the Global Financial Crisis (GFC) of 2008, and unique policy measures ever since, emphasize the importance of understanding the effects of COVID-19 within this context.

As we delve into the investigation of the impact of COVID-19 on NPLs, it becomes essential to consider the diverse countries' cultural backgrounds and policy responses. The diverse cultural fabric of the European economies influences how bank managers, debtors, and the nations as a whole perceive and navigate the challenges posed by the pandemic (Kostis et al. 2018; Petrakis et al. 2015; Petrakis and Kostis 2013; Boubakri et al. 2017; Ashraf et al. 2016; Gaganis et al. 2020; Giannetti and Yafeh 2012; Boubakri et al. 2023). The cultural variations of European nations can shape both borrowers' and banks' attitudes toward risk management strategies and financial decisions, consequently impacting loan repayments and defaults (Kostis et al. 2018; Petrakis et al. 2015; Petrakis and Kostis 2013). For instance, a culture that highly values tradition and security may lead to more conservative financial behaviors, thereby reducing the likelihood of loan defaults. Conversely, a culture that emphasizes innovation and competitiveness might encourage economic activities that enhance loan repayment capabilities (Kostis et al. 2018; Petrakis et al. 2015). Therefore, considering the unique cultural values of European economies is pivotal for conducting a holistic investigation of the pandemic's impact on NPLs in the European landscape.

Motivated by the work of Ari et al. (2021) on the dynamics of non-performing loans during banking crises and Duan et al. (2021) on bank systemic risk around COVID-19, this study examines the influence of COVID-19 on the NPLs of the European Banking System. Specifically, Ari et al. (2021) utilized data on past banking crises to identify pre-crisis predictors of NPLs and provide insights into post-COVID-19 NPL vulnerabilities using the IMF's GDP growth forecasts. However, they did not consider the pandemic period or the heterogeneity within European subregions. Furthermore, while Duan et al. (2021) conducted a comprehensive study on the impact of the pandemic on bank systemic risk, it focused solely on the effect of initial government policy responses on systemic risk and did not consider the influence of quantitative easing (QE) policy responses. Although they employed Hofstede's five cultural dimensions to assess national culture (Hofstede 2001), they did not incorporate crucial cultural factors, such as tradition and security, as outlined by Schwartz (1994). These factors can shape both borrowers' and banks' attitudes toward financial decisions and, consequently, impact loan repayments and defaults. Moreover, Schwartz's (1994) cultural dimensions framework also included data obtained from diverse regions, including socialist countries. Another advantage of Schwartz's (1994) framework is that it delves deeper into the intricacies of national culture, allowing us to capture a broader range of cultural variations that may influence loan defaults.

Utilizing panel data analysis with country-fixed effects, we conducted a comprehensive comparison between the pre-pandemic period (2015Q1–2019Q4), the post-pandemic period (2020Q1–2021Q4), as well as the entire period of analysis (2015Q1–2021Q4). For this purpose, we utilized a unique quarterly dataset of aggregated data spanning from 2015 to 2021. We chose to commence our analysis from 2015Q1 due to several considerations.

First, it allowed us to provide a holistic view of the European banking landscape before the pandemic, reducing potential biases associated with shorter observation periods. Second, in 2014, the European Banking Authority (EBA) introduced a harmonized NPL definition of NPLs across European countries (EBA 2019). We chose to begin our analysis from 2015Q1, since this period coincides with the harmonized NPL definition introduced by the EBA, leading to consistent and comparable data and minimizing biases arising from varying international NPL definitions. We chose to end our analysis in 2021Q4 to focus on the period during which the pandemic's effects on NPLs were most pronounced. Additionally, we chose this period to avoid exogenous disruptions stemming from the war between Russia and Ukraine and to ensure our results remained specific to the pandemic period.

We formulated several questions to be answered: (1) How did COVID-19 impact the NPLs of the European economies? (2) Did it differ between core and peripheral economies? (3) What were the primary factors of COVID-19 that affected the change in NPLs? (4) Did the government's economic support policies to mitigate the pandemic manage to absorb the impact of the pandemic on NPLs? (5) Did central bank QE economic support measures aid in minimizing the risk of a new wave of NPLs? (6) Did national culture shape banking institutions and borrowers' behavior in preventing the rise of NPLs? (7) Did bank securitization strategies contribute to NPL reduction?

Our research contributes to the existing literature (Ari et al. 2020; Žunić et al. 2021; Loang et al. 2023; Apergis 2022; Ari et al. 2021; Duan et al. 2021) by being the first to conduct a comprehensive analysis of the effects of COVID-19 on the European Union's NPLs, distinguishing by European subregion and country-level prosperity. Second, our research also explores the impact of NPL types and sectoral NPLs. Third, it considers the bank securitization strategies as a means of NPL reduction, emphasizing their effectiveness in reducing NPLs. By discerning the impact of COVID-19 on NPLs across various sectors and loan types, we may provide granular insights for effectively managing NPL risks and promoting economic resilience in the aftermath of the pandemic. While Žunić et al. (2021) addressed the factors influencing NPLs during the COVID-19 period, providing useful insights, they lacked a broader European context. Moreover, while Ari et al. (2021) provided insights regarding NPL vulnerabilities for the post-COVID-19 period, they based their analysis on past banking crises, lacking the incorporation of actual post-COVID-19 period data. Furthermore, they did not comprehensively explore the pandemic's impact on various types of NPLs and sectoral NPLs. While Apergis (2022) provided insights into the existence of NPL homogeneity amongst EU countries, he did not consider policy responses, cultural intricacies, or diverse NPLs types/sectoral NPLs in his analysis. Our study endeavors to fill these unexplored territories by conducting a detailed analysis in this area, while also encompassing a broader spectrum of dimensions to foster a more comprehensive understanding.

The remainder of the paper is laid out as follows. In Section 2, we provide the theoretical and conceptual framework. In Section 3, we provide the literature review. The data, variables, econometric models, and empirical methodology used are all described in Section 4. The empirical results and the robustness checks are presented in Sections 5 and 6, respectively. The conclusions and future research are presented in Section 7.

2. Theoretical and Conceptual Framework

This section aims to identify key theories and elaborate the conceptual model of our investigation on the impact of the COVID-19 pandemic on NPLs across European economies. By integrating relevant theoretical perspectives, we provide a holistic framework that explains how cultural dimensions, economic shocks, and policy responses interact and influence NPL dynamics. The next paragraph underpins key theoretical perspectives, and the third paragraph outlines the conceptual framework.

The exploration of the impact of the COVID-19 pandemic on NPLs in European economies can be rooted in utilizing Schwartz's (1994) theory of cultural values, Minsky's (1992), Kindleberger and Aliber's (2011) theories on financial stability and banking crises,

as well as Bernanke's (2009) theory on policy responses to economic crises. Schwartz (1994) identified ten universal values, including stimulation, hedonism, achievement, and benevolence, that shape individual and organizational behavior. Minsky (1992) implied that financial systems are inherently unstable and prone to cycles of boom and bust, often triggered by economic shocks. Kindleberger and Aliber (2011) complemented this by focusing on historical patterns of financial crises, where speculative bubbles and crashes are central themes. Bernanke (2009) emphasized the importance of proactive monetary and fiscal policies in mitigating the impacts of economic downturns.

In our conceptual framework, we integrated these theoretical perspectives to provide a holistic understanding of the dynamics related to the effect of the COVID-19 pandemic on NPLs. The framework encompasses three key components: (1) cultural values, as measured by Schwartz's (1994) framework, which influences borrower behavior and bank risk management; (2) the economic spillovers of the COVID-19 pandemic, which disrupted economic activities and increased financial uncertainties, in line with the theories of Minsky's (1992), Kindleberger and Aliber (2011); (3) government and central bank policy responses, such as economic support and quantitative easing measures, aimed at stabilizing the economy and supporting businesses and households, in line with Bernanke (2009). The significance of this theoretical framework lies in its ability to capture the multifaceted nature of NPL dynamics in the context of the COVID-19 pandemic. Specifically, it captures the complex interplay of cultural values, economic shocks, and policy responses. By doing so, it provides a holistic view of how these factors collectively influenced NPL ratios in the European economies during the pandemic.

3. Literature Review

This section aims to identify the pre- and post-COVID-19 pandemic literature and to identify key studies that will aid in our selection of the appropriate candidate predictor variables for our analysis. The pre-pandemic literature is investigated in Section 3.1 and the post-pandemic literature is investigated in Section 3.2.

3.1. Pre-COVID-19 Pandemic Literature

The initial scientific literature regarding the impact of COVID-19 on European banks' NPLs anticipated that the pandemic would lead to a surge of NPLs. This assumption was primarily based on historical research and speculative reasoning.

Ari et al. (2020) stated that the COVID-19 pandemic would most likely lead to an increase in NPLs. However, they also mentioned that banks have a modest advantage, as they had already undertaken initiatives to raise their capital ratios after the GFC. Laeven and Valencia (2018) agreed, indicating that elevated NPL ratios are a recurrent feature of banking crises and are often assessed in the aftermath of such events. Brunnermeier and Krishnamurthy (2020) disagreed, however, stating that the lessened regulatory stance of the European Central Bank (ECB) and the EBA, along with government loan guarantees, would assist financial institutions in managing the COVID-19 crisis. Bitar and Tarazi (2022) also stated that before the pandemic, banks maintained sufficient funds. However, they also argued that by releasing cash reserves and implementing additional measures, such as easing the management of NPLs, banks' earning potential could be jeopardized, potentially leading to a prolonged downturn. From a regulatory standpoint, the EBA and ECB forecasted a reduction in 2020 and an upsurge in 2021 (Couppey-Soubeyran et al. 2020).

It is clear from the above analysis that in the pre-COVID-19 pandemic literature, there were contradictions regarding the impact of COVID-19 on NPLs. Although one literature branch expected a new wave of NPLs, another literature branch expected that banks would have a modest advantage due to the concentration of capital reserves after the GFC. We also noticed a third literature branch implying that quantitative easing measures might mitigate the impact on NPLs.

3.2. Post-COVID-19 Pandemic Literature

After the COVID-19-related data started to crystallize, scientific studies on the impact of the COVID-19 pandemic on NPLs revealed additional and unexpected outcomes. In our research, we identified the most pertinent literature on the relationship between the COVID-19 pandemic and NPLs.

Sharif et al. (2020) stated that the risk associated with the COVID-19 pandemic is perceived differently in the short and the long term and may be viewed as an economic crisis. Rizwan et al. (2020) derived that the COVID-19 pandemic significantly contributes to a country's systemic risk, due to successive COVID-19 lockdowns. As systemic risk increases, NPLs tend to increase as well. Duan et al. (2021) stated that the COVID-19 pandemic exacerbates preexisting financial vulnerabilities. Apergis (2022) added that those vulnerabilities are not uniform across the EU countries. More specifically, they stated that banks that are deleveraged, undercapitalized, and have low profitability indices are susceptible to the pandemic. On the other hand, banks with elevated capital and profitability indices can withstand the adverse impacts of the pandemic. Dunbar (2022) suggested that although COVID-19 poses a significant risk to the bank's financial soundness, the relaxed regulatory stance of central banks might enable the release of capital buffers, thereby facilitating lending and enhancing overall financial stability. According to Kozak (2021), larger banks, being more profitable, exhibited increased stability during the pandemic, compared to smaller banks. Xie et al. (2024) emphasized that during the pandemic, financially strong banks, offering competitive products and services, can play a significant role in facilitating economic growth. Demir and Danisman (2021) argued that well-capitalized banks that have low NPL levels and are larger in size are more resilient to the pandemic. They added that government financial aid initiatives considerably assisted banks in dealing with the financial and capital losses incurred as a result of the economic spillovers caused by the pandemic. Ari et al. (2021) added that monetary and prudential policies may mitigate the rapid credit expansion, leading to a decrease in NPLs. Yi et al. (2022) emphasized the significance of enhanced regulations in preventing excessive credit expansion.

Foglia et al. (2022) found that the pandemic had a heterogeneous effect on the Eurozone banking system. However, due to the intricate interconnections among European banks, the European banking system may be "too interconnected to fail." This implies that the higher profitability levels of high-income economies may hinder the ability of banks in low-income economies to incur losses. Kryzanowski et al. (2022) added that banks with high-quality capital were more resilient to the crisis and were able to effectively control their NPL ratios. Mateev et al. (2022) argued that bank performance strongly depends on both banks' efficiency and market power. Moreover, Cowling et al. (2022) stated that small business firms are particularly vulnerable to the economic spillovers stemming from COVID-19. They added that COVID-19 increases the possibility of SME bankruptcy, which translates into increased NPL ratios related to those firms. On the other hand, Wellalage et al. (2022) added that although the adverse effect of COVID-19 is anticipated to inflict substantial and enduring damage on SMEs, a firm's access to external finance can mitigate the negative impacts of the pandemic. This was further supported by Naili and Lahrichi (2022), who highlighted that the pandemic posed disproportionate effects. Regarding the impacts of the pandemic on banking performance, Salazar et al. (2023) stated that the COVID-19 pandemic has introduced high uncertainty and economic downturn, ultimately affecting banks' performance. Alnabulsi et al. (2023a) also contributed to this discussion by underscoring the complex relationships between NPLs and bank performance. In another study, Alnabulsi et al. (2023b) also emphasized that NPLs can significantly destabilize banks, particularly in times of economic crisis, stressing the importance of robust risk management practices to mitigate these effects.

It is clear from the post-COVID-19 pandemic literature that the successive lockdowns to mitigate the pandemic were expected to affect the banks' systemic risk and lead to a rise in NPLs. Additionally, the literature highlighted that the pandemic would worsen preexisting financial vulnerabilities, with heterogeneous impacts on European economies.

The literature suggested that SMEs are particularly vulnerable and may experience a rise in their NPLs. Banks that are financially strong were expected to withstand the adverse effects of the pandemic. Furthermore, the post-COVID-19 pandemic literature supplements the pre-COVID-19 pandemic literature, suggesting that government and central bank policy responses might assist banks in dealing with the economic spillovers of the pandemic.

From the above analysis, we derived several gaps in the existing literature. First, the impact of cultural dimensions on NPLs was largely overlooked. Second, there was inadequate attention to the heterogeneous impacts across European subregions. Third, existing studies often did not comprehensively integrate government and central bank policies with other economic indicators. Additionally, many studies focused on the immediate impact of the pandemic without extending the analysis to the post-pandemic period. Our study endeavors to fill these unexplored territories by conducting a detailed analysis, while encompassing a broader spectrum of dimensions to foster a more comprehensive understanding.

4. Data and Specification Model—Empirical Methodology

This section aims to describe the collection of the data used in this study (Section 4.1) and define the candidate predictors and their expected impacts on the NPLs (Section 4.2); furthermore, it outlines the empirical methodology and the empirical models employed (Section 4.3).

4.1. Data Construction

Our dataset consisted of quarterly aggregate country data spanning from 2015Q1 to 2021Q4 for 28 European economies.[1] The final sample consisted of an unbalanced panel of 28 countries with 784 observations (the distribution of observations by country can be found in Table A1 of Appendix A).

The primary dependent variable was the ratio of NPLs to total (gross) loans (NPLs), consisting of 684 observations, while we alternated between various types and sectoral NPLs. The reduction in the NPL sample size was primarily due to data reporting disparities and, in some cases, missing or incomplete data in certain quarters or countries. We deliberately opted not to employ data imputation methods, preserving the data integrity of the dependent variable. The primary dependent variables' data were obtained from the ECB data portal. The data for NPL types and sectoral NPLs were all from the EBA. We chose our sample period to coincide with the establishment of a harmonized NPL approach (EBA 2019) to eliminate international NPL definition inconsistencies. Regarding the candidate predictors, we categorized our data into three variable groups: one group included the COVID-19 variables, another group included the QE-related variables, and the third group contained the COVID-19 government response variables. To effectively capture the impact of our candidate predictors on the NPLs, we incorporated a range of control factors, such as macroeconomic, bank-specific, regulatory, and national culture-related factors. All the variables employed in our analysis are expressed at an aggregate level. We did not need to convert bank-specific variables to the country level by using standardization strategies since the EBA had already aggregated these variables at the country level during the data collection process. Notably, the European banks fill out the required information in the reporting templates following a harmonized methodology approach. The regulatory authority then compiles and aggregates the data contained in those templates by using strategies for addressing variations in reporting practices, ensuring consistency and comparability across European countries.

Ten national cultural dimensions based on Schwartz's (1994) theory of cultural values were included, with data collected from the European Social Survey (ESS). Data from four ESS questionnaires were evaluated: ESS Round 7 (2014), Round 8 (2016), Round 9 (2018), and Round 10 (2020). For each nation, a percentage of positive responses was calculated, and biennial figures were assigned to quarters according to the questionnaire timeframes. We imputed the missing data with values corresponding to the nearest pre-

ceding questionnaire period, assuming that cultural values remained relatively stable in the short term. The missing values from earlier questionnaire periods were left unaltered. Following this approach, we ended up with a small number of missing data[2], while increasing data accuracy. Principal component analysis (PCA) was applied for dimensionality reduction. The synthetic "Culture_PCA" variable contained information from the first two principal components, explaining 73% of the total variation. The generated variable was primarily and positively driven by the cultural values of IMPTRAD ("Tradition"), IMPENV ("Universalism"), IPEQOPT ("Benevolence"), and IPRULE ("Power").

A detailed description of all variables employed, and their respective data sources, is presented in detail in Tables A2–A4 of Appendix A (although Table A4 lists the cultural dimensions and the synthetic "CULTURE_PCA" variable, the tests performed, the eigenvalues, as well as the primary drivers of the synthetic variable are not reported due to space limitations but are available upon request).

4.2. Expected Channels of Impact

Table 1 lists both the candidate predictors and the control variables, along with their projected relationship to the main dependent variable (NPLs), based on the respective literature. Table 1 focuses on presenting the projected relationship of candidate predictors to the output variable NPLs and, therefore, does not include the dependent variables used in this research. A positive projected relationship is indicated by the '+' sign, while a negative projected relationship is indicated by the '−' sign. A detailed presentation of the primary dependent variable and secondary dependent variables is presented in Table A2 of Appendix A.

Table 1. Variables and expected channels of impact.

Variable Group	Variable Symbol	Parameter Shown	Explanation	Related Literature	Expected Sign
Macroeconomic Variables	UNEMP	Percentage (%)	% of unemployment	(Makri et al. 2014; Ceylan et al. 2020; Bassani 2021)	(+)
	CPI	No.	Quarterly Consumer Price Index	(Makri et al. 2014)	(+)
	R_GDP_Q2Q	Percentage (%)	Quarterly percentage growth rate of real GDP	(Makri et al. 2014)	(−)
	GDP_MARKET	No.	Quarterly gross domestic product at market prices	(Makri et al. 2014)	(−)
Bank-specific Variables	NPLS (-1)	Percentage (%)	Previous quarter aggregate non-performing loans to total gross loans	(Makri et al. 2014)	(+)
	ROA	Percentage (%)	Return on assets: profit or loss for the year/total assets	(Makri et al. 2014; Colak and Öztekin 2021)	(−)
	CAP	Percentage (%)	Bank capital and reserves to total assets	(Makri et al. 2014; Colak and Öztekin 2021; Bitar and Tarazi 2022)	(−)/(+)
	LOAN_DISBRS	Percentage (%)	Loan disbursments to customers	(Naili and Lahrichi 2022)	(+)
	FINANCIAL_ASSETS	No.	Total financial instruments on the asset side	(Alessi et al. 2022)	(−)
	PROVISIONS	Percentage (%)	Impairments (credit risk losses)/equity	(Ozili and Outa 2017)	(−)
	RISK_CAPITAL	Percentage (%)	Total risk exposure amount for position, foreign exchange, and commodities risks/total risk exposure amount	(Bitar and Tarazi 2022)	(−)

Table 1. *Cont.*

Variable Group	Variable Symbol	Parameter Shown	Explanation	Related Literature	Expected Sign
Bank-specific Variables	OPER_RISK	No.	Total risk exposure amount for OpePercentage (%)ns/total risk exposure amount	(Bitar and Tarazi 2022)	(−)
	LIABILITIES	No.	Total deposits other than from banks/total liabilities	(Ozili and Outa 2017)	(−)
	CASH_BALANCES	Percentage (%)	Cash positions/total assets	(Alessi et al. 2022)	(−)
	FINANCIAL_ASSETS	No.	Total financial instruments on the asset side	(Alessi et al. 2022)	(−)
	EQUITY	Percentage (%)	Equity instruments/total assets	(Durand and Le Quang 2022)	(−)
	TOTAL_ASSETS	No.	Total assets	(Alessi et al. 2022)	(−)
	RETAINED_EARNINGS	Percentage (%)	Retained earnings/Tier 1 capital volume	(Ahmed et al. 2021)	(−)
	DERIVATIVES	Percentage (%)	Derivatives/total assets	(Mayordomo et al. 2014)	(−)
	CRED_DEPOSITS	Percentage (%)	Deposits from credit institutions/total liabilities	(Ozili 2019)	(−)
Regulatory Variables	TIER1_CAP	No.	Additional Tier 1 capital	(Bitar and Tarazi 2022)	(−)
	COVER_PERCENTAGE (%)	Percentage (%)	Accumulated impairment, accumulated negative changes in fair value due to credit risk for non-performing loans and advances/total gross non-performing loans and advances	(Bitar and Tarazi 2022; Alessi et al. 2022)	(−)
	RWA_VOLUME	No.	RWA volume	(Bitar and Tarazi 2022)	(−)
	OWN_FUNDS_TIER1	No.	Tier 1 capital volume	(Bitar and Tarazi 2022)	(−)
	SECURITIZATION	Percentage (%)	Securitization positions/risk-weighted exposure amounts for credit, counterparty credit, and dilution risks and free deliveries	(Di Tommaso and Pacelli 2022)	(−)
Quantitative Easing Variables	PEPP_PURCHASES	No.	Net purchases at book value	(Rizwan et al. 2020; Ari et al. 2021; (Hoang et al. 2021)	(−)
	ASSET_TO_GDP	Percentage (%)	Total assets/quarterly gross domestic product at market prices	(Rizwan et al. 2020; Ari et al. 2021; Hoang et al. 2021)	(−)
	QE_ANNOUNCEMENT	Binary (1/0)	Quantitative Easing (QE) Announcement: 1 Corresponding to dates: 18/03/2020 and 04/06/2020.	(Rizwan et al. 2020; Ari et al. 2021; Hoang et al. 2021)	(−)
	EXP_ASSET_PURC	No.	Expanded Asset Purchase Program (APP)	(Rizwan et al. 2020; Ari et al. 2021; Hoang et al. 2021)	(−)
	BOND_PURC	No.	Covered bonds purchases at book value (CBPP3)	(Rizwan et al. 2020; Ari et al. 2021; Hoang et al. 2021)	(−)

Table 1. *Cont.*

Variable Group	Variable Symbol	Parameter Shown	Explanation	Related Literature	Expected Sign
COVID-19 Variables	COVID19_DUMMY	Binary (1/0)	COVID-19 pandemic existence	(Demir and Danisman 2021; Laeven and Valencia 2018; Laeven and Valencia 2020, 2021)	(+)
	COVID19_VACCINATED	No.	COVID-19 vaccinated	(Demir and Danisman 2021; Laeven and Valencia 2018; Laeven and Valencia 2020, 2021)	(−)
	COVID19_DEATHS	No.	COVID-19 deaths	(Demir and Danisman 2021; Laeven and Valencia 2018; Laeven and Valencia 2020, 2021)	(+)
Cultural Dimension Variables	CULTURE_PCA	Percentage (%)	Cultural identity	Author's Calculations	(−)
COVID-19 Government Response Variables	CONTNMN	Index	Government response containment index	(Hoang et al. 2021; Couppey-Soubeyran et al. 2020; (Bassani 2021)	(+)
	GOVT_RESP_STR	Index	Government response stringency index	(Hoang et al. 2021; Couppey-Soubeyran et al. 2020; Bassani 2021)	(+)
	GOVT_ECON_SUP	Index	Government response economic support index	(Hoang et al. 2021)	(−)

A positive projected relationship is indicated by the '+' sign, while a negative projected relationship is indicated by the '−' sign.

4.3. Methodology and Econometric Models

We investigated the impact of COVID-19 on the NPLs in the European Union (EU28) during the period 2015–2021. OLS methodology for panel data was utilized to analyze and quantify the impact of the candidate predictor on the NPLs. Panel data analysis was conducted by utilizing fixed and random effects. Panel data leverage both the time-series and cross-sectional dimensions, enabling a comprehensive analysis. Although cointegration techniques are effective for identifying long-term equilibrium relationships between variables, we did not employ these methods in our analysis. Our study focused on the short- to medium-term impacts of COVID-19 on NPLs, making cointegration less relevant for our research objectives. We performed all the requirements for the whole sample period and then used the Hausman test to check the suitability of the random effects over the fixed-effects method. Most of the models developed are estimated using country-fixed effects, allowing for the management of time-constant unobserved country heterogeneity. Our research did not delve into company-specific characteristics. Therefore, we opted for country-fixed effects over individual fixed effects in our analysis, since our study focused on aggregated data at the country level. Several stationarity tests were performed to evaluate if the values were (trend)stationary.[3] We transformed the non-stationary variables to stationary by applying first and second differences accordingly.[4] Notably, the primary dependent variable, NPL, was identified to contain a unit root. To achieve stationarity in the NPL series, we applied the first differences. This step was essential to avoid producing biased results. The newly created NPL series effectively captured the variations in the NPL ratio over time. After differentiating when appropriate, the final dataset consisted only of stationary variables.[5]

Next, we also applied the Durbin–Watson statistic to recognize potential autocorrelation in the residuals. Based on the indication of the Durbin–Watson statistic, we

incorporated one and two lag periods of the dependent variable into our analysis.[6] This strategic inclusion mitigated the autocorrelation in the residuals, ultimately enhancing the robustness of our regression estimates. Moreover, we used the Akaike Information Criterion (AIC) to choose the appropriate lag length. Considering that the dynamic panel may yield biased results, as stated by Roodman (2009), and that an alternative model, such as GMM, could more effectively address issues such as reverse causality and omitted variable bias, we proceeded by comparing the two estimators before continuing with the analysis. Specifically, based on Bettinger (2010), we employed the Hausman test to compare the OLS and Generalized Method of Moments (GMM) method for dynamic panels (Hansen 1982). The Hausman test revealed that OLS yielded consistent estimates. Furthermore, when heteroscedasticity was present, either across cross-sectional units or across time segments, we applied the white cross-section or white period coefficient covariance method, respectively. Finally, we included autoregressive (AR) terms where appropriate, to mitigate potential autocorrelation in the error terms and to capture temporal dependencies between the data. To validate this choice, we performed additional analysis using both robust standard errors and AR components. The comparative results yielded that while robust standard errors adequately addressed autocorrelation, the inclusion of AR terms provided a more comprehensive model fit, capturing the temporal dynamics inherent in the NPL data more effectively.

In line with Xie et al. (2024), our strategy involved facilitating a comparative approach. While Xie et al. (2024) examined the pre- and post-COVID-19 periods, we expanded by analyzing and comparing three sample periods: (1) one related to the pre-COVID-19 period (Q1:2015 to Q4:2019), (2) one related to the post-COVID-19 period (Q1:2020 to Q4:2021), and finally, (3) one related to the entire period of analysis (Q1:2015 to Q4:2021). Both pre- and post-COVID-19 samples were a byproduct of the total sample period. While we included relevant COVID-19 variables in the models related to the post-COVID-19 period, data limitations and their unavailability before the pandemic[7] restricted their inclusion in pre-COVID-19 models. Instead, we incorporated the COVID19_DUMMY variable, a dummy variable with values 1/0 (1, corresponding to the pandemic's existence, and 0 otherwise), in the model related to the entire period of analysis. This variable effectively captures the pandemic occurrence. This strategy allowed us to assess the impacts of COVID-19 across the entire period and facilitate comparison, while also acknowledging the data constraints. While we included the COVID-19 variables in the post-COVID sample period, we included the COVID19_DUMMY variable only in the sample related to the entire sample period.

Based on the above, we formulated the following baseline estimation models:

Pre-COVID-19 period:

$$DNPL_{i,t} = \beta_0 + \beta_1 \times DNPL_{i(t-1),1} + \beta_2 \times DB_{it,2} + \beta_3 \times DM_{it,3} + \beta_4 \times DR_{it,4} + \beta_5 \times CULTURE\_PCA_{it,5} + u_{it} \quad (1)$$

Post-COVID-19 period:

$$DNPL_{i,t} = \beta_0 + \beta_1 \times DNPL_{i(t-1),1} + \beta_2 \times DB_{it,2} + \beta_3 \times DM_{it,3} + \beta_4 \times DR_{it,4} + \beta_5 \times CULTURE\_PCA_{it,5} + \beta_6 \times DQE_{it,6} + \beta_7 \times DG_{it,7} + \beta_8 \times DC_{it,8} + u_{it} \quad (2)$$

Total period:

$$DNPL_{i,t} = \beta_0 + \beta_1 \times DNPL_{i(t-1),1} + \beta_2 \times DB_{it,2} + \beta_3 \times DM_{it,3} + \beta_4 \times DCOVID19\_DUMMY_{it,4} + \beta_5 \times CULTURE\_PCA_{it,5} + \beta_6 \times DQE_{it,6} + u_{it} \quad (3)$$

where $DNPL_{i,t}$ denotes the aggregate non-performing loans to total gross loans, $DNPL_{i(t-1),1}$ corresponds to the NPLs of the prior quarter, $DB_{it,2}$ denotes the bank-specific variables, $DM_{it,3}$ represents the macroeconomic factors, $DR_{it,4}$ denotes the regulatory variables, the $DCOVID19\_DUMMY_{it,4}$ denotes the dummy variable related to COVID-19 existence,[8] the $CULTURE\_PCA_{it,5}$ denotes the control variable representing each nation's cultural identity, $DQE_{it,6}$ denotes the QE policy response variables, $DG_{it,7}$ denotes the government economic policy response variables, and finally, $DC_{it,8}$ denotes the COVID-19-related factors. Note that i corresponds to the examined country of the sample and t to the year. We used one

lag for selected bank-specific and macroeconomic regressors to achieve optimum model fit based on the indication of the Durbin–Watson statistic and to capture the dynamics of explanatory variables over the previous quarter.

We followed a top-down approach by breaking down further and analyzing each period into additional subsamples with alternative characteristics. Specifically, we explored the pandemic's impact on the European subregion, on country-level prosperity, distinguishing by NPL type and NPL economic sector/activity. We distinguish the core and peripheral economies based on the Phillips and Sul (2007) approach. Table A1 of Appendix A displays the classification of countries based on subregions and core/peripheral economies.

To obtain deeper insight into the relevance of the explanatory variables and to account for multicollinearity, we first controlled only by bank-specific and macro variables. We then included the regulatory variables, and next we included the government response variables; finally, we included the QE policy response variables (Table A3 of Appendix A). Moreover, we regressed by different NPL types and NPL economic sectors, by consecutively employing the dependent variables presented in Table A2 of Appendix A.

The empirical analysis was divided into baseline and subsample estimations. Although we chose to include the CULTURE_PCA factor in all baseline estimation models (Section 5.2), in the subsample analysis (Section 5.3), the CULTURE_PCA variable was included only in the models related to the post-COVID-19 period.

5. Results and Discussion

This section presents the main regression estimates, followed by a relevant discussion. Section 5.1 delves into the results of descriptive statistics and the correlation matrix, Section 5.2 presents the results of the baseline estimations, and Section 5.3 presents additional empirical results distinguishing by European subregion, core and peripheral European economies, NPL type, and NPL economic sector.

5.1. Descriptive Statistics

Before proceeding with our regression results, we generated descriptive statistics and correlation matrices. Table 2 depicts the descriptive statistics (individual samples) of both the primary dependent variable and the candidate predictors employed in the current research for the period 2015Q1 until 2021Q4 (descriptive statistics of secondary dependent variables and control variables are not shown due to space constraints). The fixed-effects method effectively mitigated the influence of high values of both non-normality distribution, as derived from the Jarque–Bera statistic, as well as kurtosis and skewness.[9] Additionally, to deal with highly correlated variables, we incorporated them in alternative empirical models.

Table 2. Descriptive statistics.

	NPLS	PEPP_PURCHASES	ASSET_TO_GDP	QE_ANNOUNCEMENT	EXP_ASSET_PURC	BOND_PURC	COVID19_DUMMY	COVID19_VACCINATED	COVID19_DEATHS	CONTNMN	GOVT_RESP_STR	GOVT_ECON_SUP
Mean	6.818929	5.705593	0.006400	0.071429	8.883617	1.006164	0.253827	2.11×10^8	1.069482	3.235154	3.152849	3.848498
Median	3.701882	0.000000	0.006056	0.000000	6.361949	8.921000	0.000000	2.568623	2.325710	3.624000	3.454800	4.125000
Maximum	4.774785	3.395420	0.025949	1.000000	2.019962	3.416300	1.000000	3.49×10^9	8.680039	5.402000	5.516100	6.600000
Minimum	0.208018	0.000000	0.000700	0.000000	0.000000	−6.250000	0.000000	0.000000	1.000000	5.450000	5.044000	0.000000
Std. Dev.	8.858129	1.026505	0.004267	0.257704	9.174503	9.572955	0.435477	5.48×10^8	1.847337	1.305790	1.389047	1.986842
Skewness	2.744479	1.405314	0.489372	3.328201	0.073791	1.157496	1.131313	3.807389	2.416297	−0.576944	−0.365652	−0.442150
Kurtosis	1.064595	3.465069	2.403187	1.207692	1.080539	3.403692	2.279869	1.837132	8.485477	2.054388	1.840860	1.989601
Jarque–Bera	2.524793	9.468567	3.756203	4.138809	4.323796	6.442512	1.841768	2.550274	4.297823	1.928888	1.627956	1.562507
Probability	0.000000	0.008789	0.000000	0.000000	0.115106	0.039905	0.000000	0.000000	0.000000	0.000065	0.000292	0.000405
Sum	4.664148	1.597566	4.390062	5.600000	2.487413	2.817260	1.990000	4.39×10^{10}	2.06×10^8	6.729120	6.557925	8.004875
Sum Sq. Dev.	53,592.59	2.85×10^{11}	0.012472	5.200000	2.272630	2.47×10^9	1.484885	6.22×10^{19}	6.55×10^{14}	3.53×10^8	3.99×10^8	8.17×10^8
Observations	684	208	686	784	208	208	784	208	193	208	208	208

Note(s): NPLS stands for aggregate non-performing loans to total gross loans; PEPP_PURCHASES represents the net purchases at book value; ASSET_TO_GDP stands for the total assets/quarterly gross domestic product at market prices; QE_ANNOUNCEMENT denotes the Quantitative Easing (QE) Announcement: 1 Corresponding to Dates: 18 March 2020 and 4 June 2020; EXP_ASSET_PURC represents the Expanded Asset Purchase Program (APP); BOND_PURC stands for covered bonds purchases at book value (CBPP3); COVID19_DUMMY stands for COVID-19 pandemic existence; COVID19_VACCINATED represents the COVID-19 vaccinated population; COVID19_DEATHS represents the COVID-19 deaths; CONTNMN stands for government response containment index; GOVT_RESP_STR stands for government response stringency index; finally, GOVT_ECON_SUP represents the government response economic support index.

5.2. Baseline Estimations

Table 3 summarizes the results of the econometric estimation model related to the three periods of analysis.

Table 3. Main empirical findings.

Empirical Model:	Empirical Model 1	Empirical Model 2	Empirical Model 3	Empirical Model 4	Empirical Model 5	Empirical Model 6	Empirical Model 7
Period Examined:	**Total**	**Before COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**
Variable Symbol	**Dependent Variable: D(NPLS)**						
D(NPLS(-1))	−0.342359	−0.183453 **	−1.020644 ***	−1.206490 ***	−1.203173 ***	−1.168123 ***	−1.145578 ***
D(UNEMP(-1))	−0.035229 ***	0.015602 ***	−0.045157 ***	−0.019558	−0.023334	−0.028111	−0.026744
D(ROA(-1))	−0.291491 ***	−0.109478	−0.175687	−0.170662	−0.216442	−0.206493	−0.204913
D(CPI(-1))	−0.000515	0.002510	−0.001905	−0.005244 ***	−0.001308	−0.001966	−0.002714
D(CAP(-1))	0.149963	−0.254603 ***	0.377711 *	0.318489	0.140830	0.230260	0.263534
D(LOAN_DISBRS(-1))	−0.003586	0.014573 *	−0.021015	−0.036377	−0.028291	−0.049109	−0.056952
R_GDP_Q2Q(-1)	−0.001371	0.022920	−0.002708	0.002934	0.000898	−0.000133	−0.000636
COVID19_DUMMY	0.032328						
COVID19_VACCINATED			-33.38×10^{-9} ***		−0.036204 ***	−0.027599 **	−0.027225 **
GOVT_RESP_STR			0.000140 **				572.9648 **
CONTNMN						578.1687 **	
GOVT_ECON_SUP			0.000058	6.64×10^{-5}			
D(ASSET_TO_GDP)				−0.002029 *			−2.775.504
COVID19_DEATHS					−3.305.095		
C	−0.411011	−0.381554	−0.657638	−0.772071	−0.493559	−0.677555	−0.709040
Observations:	402	305	97	90	85	97	90
R-squared:	0.529274	0.656643	0.762686	0.730969	0.745125	0.738525	0.740121
F-statistic:	6.573298	6.731721	8.652614	7.942145	0.637128	0.641406	0.632869
Prob(F-stat):	0.000000	0.000000	0.000000	0.000001	0.000000	0.000000	0.000000

Note(s): (1.) Model 1 refers to the total sample period: 2015Q1–2021Q4, aiming to explore the COVID-19 impact on the change in NPLs of the European banks. Model 2 refers to the period before the COVID-19 pandemic: 2015Q1–2019Q4, aiming to examine the macro and bank-specific variables' effect on the change in NPLs. Models 3 to 7 refer to the period after the pandemic: 2020Q1–2021Q4, aiming to examine the effect of both COVID-19 and policy response variables on the change in NPLs, as well as the effect of the central bank and government policy support measures. (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the p-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. (3.) NPLS stands for aggregate non-performing loans to total gross loans; UNEMP represents the % of unemployment; ROA stands for return on assets; CPI stands for quarterly consumer price index; CAP represents the bank capital and reserves to total assets; LOAN_DISBRS represents the loan disbursements to customers; R_GDP_Q2Q stands for the quarterly percentage growth rate of the real GDP; COVID19_DUMMY stands for the COVID-19 pandemic existence; COVID19_VACCINATED represents the vaccinated population against the COVID-19 pandemic; GOVT_RESP_STR stands for government response stringency index; CONTNMN stands for government response containment index; GOVT_ECON_SUP represents the government response economic support index; ASSET_TO_GDP stands for the total assets/quarterly gross domestic product at market prices; finally, COVID19_DEATHS represents the COVID-19 deaths. (4.) The (-1) denotes one period lag. This note also applies to Tables 3 and 4. (5.) We opted not to include t-statistics for the economy of space. Also, the inclusion of coefficient estimates and p-values effectively communicates the statistical significance of our results. This note also applies to Tables 3 and 4.

Table 4. Main empirical findings with the inclusion of the cultural identity (CULTURE_PCA) control variable.

Empirical Model:	Empirical Model 1	Empirical Model 2	Empirical Model 3	Empirical Model 4	Empirical Model 5	Empirical Model 6	Empirical Model 7
Period Examined:	**Total**	**Before COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**
Variable Symbol	**Dependent Variable: D(NPLS)**						
D(NPLS(-1))	−0.785255 ***	−0.019509	−1.704412 ***	−2.807484 ***	−1.125098 ***	−2.606772 ***	−2.542010 ***
D(UNEMP(-1))	−0.000233 ***	0.018100 ***	−0.135149 ***	0.054589	−0.055827	0.026299	0.048239
D(ROA(-1))	−0.003389 ***	0.005782	−1.482710 **	−1.177897 *	−0.529568	−1.178363	−1.486075 *
D(CPI(-1))	−0.000159 ***	0.001973	−0.020326	−0.031509 *	0.001022	−0.033672	−0.039164 *
D(CAP(-1))	0.304569 ***	−0.236408 ***	0.213311	1.441384 ***	0.716930	1.040842 *	1.862165 **
D(LOAN_DISBRS(-1))	-7.51×10^{-5}	0.009489	−0.169374	−0.352748 *	−0.047177	−0.206157	−0.286899 *
R_GDP_Q2Q(-1)	−0.000220 ***	0.016549	−0.024380	−0.041457 *	−0.030766	−0.031095	−0.037303

Table 4. *Cont.*

Empirical Model:	Empirical Model 1	Empirical Model 2	Empirical Model 3	Empirical Model 4	Empirical Model 5	Empirical Model 6	Empirical Model 7
Period Examined:	**Total**	**Before COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**
Variable Symbol	**Dependent Variable: D(NPLS)**						
COVID19_DUMMY	0.005049						
COVID19_VACCINATED			-2.13×10^{-9}		−0.099896 ***	0.025171	0.023815
GOVT_RESP_STR			0.000196 **				1365.652 ***
CONTNMN						−9.796766	
GOVT_ECON_SUP			0.000135	−46.53331			
D(ASSET_TO_GDP)				−84.60416			−13.21214 **
COVID19_DEATHS					11.64699 *		
CULTURE_PCA	−0.000780 ***	0.007468	−0.169073 ***	−0.105757 *	−0.412581 ***	−0.137801 *	−0.114973 *
C	−0.001125	−0.353802	−0.693554	−1.527742	−0.259571	−1.184283	−1.366887
Observations:	355	261	94	87	82	94	87
R-squared:	0.993921	0.723856	0.958924	0.976036	0.956702	0.945497	0.978265
F-statistic:	6.799609	8.493018	8.646293	4.329519	9.722032	6.425089	1.166894
Prob(F-stat):	0.000000	0.000000	0.000000	0.000476	0.000000	0.001973	0.001288

Note(s): (1.) Model 1 refers to the total sample period: 2015Q1–2021Q4, aiming to explore the COVID-19 impact on the change in NPLs of the European banks controlling for the cultural identity. Model 2 refers to the period before the COVID-19 pandemic: 2015Q1–2019Q4, aiming to examine the macro and bank-specific variables' effect on the change in NPLs controlling for the cultural identity. Models 3 to 7 refer to the period after the pandemic: 2020Q1–2021Q4, aiming to examine the effect of both COVID-19 and policy response variables on the change in NPLs, as well as the effect of the central bank and government policy support measures controlling for the cultural identity, respectively. The number of observations was adjusted in each model to account for the inclusion of the CULTURE_PCA variable. (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the *p*-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. (3.) NPLS stands for aggregate non-performing loans to total gross loans; UNEMP represents the % of unemployment; ROA stands for return on assets; CPI stands for quarterly consumer price index; CAP represents the bank capital and reserves to total assets; LOAN_DISBRS represents the loan disbursements to customers; R_GDP_Q2Q stands for the quarterly percentage growth rate of the real GDP; COVID19_DUMMY stands for the COVID-19 pandemic existence; COVID19_VACCINATED represents the vaccinated population against the COVID-19 pandemic; GOVT_RESP_STR stands for government response stringency index; CONTNMN stands for government response containment index; GOVT_ECON_SUP represents the government response economic support index; ASSET_TO_GDP stands for the total assets/quarterly gross domestic product at market prices (a representative of quantitative easing measures); COVID19_DEATHS represents the COVID-19 deaths; finally, the variable CULTURE_PCA represents the synthetic cultural identity variable. (3.) The introduction of the variable CULTURE_PCA in Table 4 led to a reduction in the total number of observations, as evident from the models presented in Table 4. This decrease in observations was attributed to the presence of missing values for the newly included variable. It is important to note that the same pattern was observed in Table 5, as the inclusion of CULTURE_PCA also impacted the overall sample size.

Table 5. Robustness stepwise regression (forward) empirical findings with the inclusion of the cultural identity (CULTURE_PCA) control variable.

Empirical Model:	Empirical Model 1	Empirical Model 2	Empirical Model 3	Empirical Model 4	Empirical Model 5	Empirical Model 6	Empirical Model 7
Period Examined:	**Total**	**Before COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**
Variable Symbol	**Dependent Variable: D(NPLS)**						
D(NPLS(-1))	−0.181402 **	−0.019509	−0.301656 *	−0.278239 *	−0.498079 **	−0.271632 *	−0.270032 *
D(UNEMP(-1))	−0.005908 *	0.003338 *	−0.000312 *	−0.001151	0.013107	0.000785	0.002276
D(ROA(-1))	−0.298137 *	0.019812	−0.305789 *	−0.368425 *	−0.318869	−0.279971	−0.281101 *
D(CPI(-1))	−0.000642 *	0.002699	−0.001511	−0.000592 *	−0.000191	−0.000225	−0.000689 *
D(CAP(-1))	0.100329 *	−0.144452 *	0.221153	0.248323 *	0.041593	0.137912 *	0.167602 *
D(LOAN_DISBRS(-1))	−0.007724	0.006638	−0.002502	−0.010842 *	0.026314	0.009312	0.004685
R_GDP_Q2Q(-1)	−0.000593 **	0.011218	−0.003963	−0.003617 *	−0.002826	−0.002181	−0.002388
COVID19_DUMMY	0.003182						
COVID19_VACCINATED			−0.030673 ***		−0.032643 **	−0.030712 ***	−0.030607 ***
GOVT_RESP_STR			180.3136 *				198.7774 *
CONTNMN						−179.7631 *	
GOVT_ECON_SUP			5.78×10^{-5}	4.84×10^{-5}			
D(ASSET_TO_GDP)				−10.65967			−3.051043 *
COVID19_DEATHS					0.410834 *		
CULTURE_PCA	−0.020594 *	−0.015615	−0.002635 **	−0.005780 *	−0.013931 **	−0.005301 *	−0.011990 *
C	−0.025936	−0.042776	−0.131299	−0.008730	−0.165630	−0.063473	−0.034680

Table 5. *Cont.*

Empirical Model:	Empirical Model 1	Empirical Model 2	Empirical Model 3	Empirical Model 4	Empirical Model 5	Empirical Model 6	Empirical Model 7
Period Examined:	**Total**	**Before COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**	**After COVID-19**
Variable Symbol	**Dependent Variable: D(NPLS)**						
Observations:	355	261	94	87	82	94	87
R-squared:	0.549349	0.587550	0.740867	0.705801	0.762225	0.731266	0.736555
F-statistic:	9.351394	4.843548	16.133090	13.471660	16.768050	16.745510	14.378710
Prob(F-stat):	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001288

Note(s): (1.) Model 1 refers to the total sample period: 2015Q1–2021Q4. Model 2 refers to the pre-pandemic period: 2015Q1–2019Q4. Models 3 to 7 refer to the post-pandemic period: 2020Q1–2021Q4. (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the *p*-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. (3.) NPLS stands for aggregate non-performing loans to total gross loans; UNEMP represents the % of unemployment; ROA stands for return on assets; CPI stands for quarterly consumer price index; CAP represents the bank capital and reserves to total assets; LOAN_DISBRS represents the loan disbursements to customers; R_GDP_Q2Q stands for the quarterly percentage growth rate of the real GDP; COVID19_DUMMY stands for the COVID-19 pandemic existence; COVID19_VACCINATED represents the vaccinated population against the COVID-19 pandemic; GOVT_RESP_STR stands for government response stringency index; CONTNMN stands for government response containment index; GOVT_ECON_SUP represents the government response economic support index; ASSET_TO_GDP stands for the total assets/quarterly gross domestic product at market prices (a representative of quantitative easing measures); COVID19_DEATHS represents the COVID-19 deaths; finally, the variable CULTURE_PCA represents the synthetic cultural identity variable. (3.) The introduction of the variable CULTURE_PCA in Table 4 led to a reduction in the total number of observations, as evident from the models presented in Table 4. This decrease in observations was attributed to the presence of missing values for the newly included variable.

Regarding the results related to the entire analysis period, we observed a statistically insignificant effect of the pandemic on the change in NPLs (variable COVID19_DUMMY), whereas bank profitability and unemployment rate had a statistically significant negative effect on the change in NPLs. The statistically insignificant impact of COVID-19 on the change in NPLs during the total period indicates that the strong capital accumulation of banks after the GFC increased bank profitability (ROA), rendering them resilient to the pandemic's effect.

Regarding the results related to the pre-COVID-19 period, our regression estimates showed that loan disbursements exerted a positive and statistically significant effect on the change in NPLs. This implies that banks should implement new risk auditing policies when granting loans. We also found that bank capitalization was significant and negatively affected the change in NPLs. This suggests that more capitalized banks were able to fare better during the crisis, which aligns with Demir and Danisman's work (2021). In line with Makri et al. (2014), we also find that the unemployment rate was statistically significant, positively affecting the change in NPLs, suggesting that higher unemployment rates were associated with an increase in the change in NPLs.

Coming to the results related to the post-COVID-19 period, we observed that both bank capitalization and strictness of lockdown measures were statistically significant factors that positively affected the change in NPLs. Our findings align with those of Yi et al. (2022) and Apergis (2022). Additionally, the QE measures assisted borrowers in meeting their regular loan repayment obligations despite the adverse macroeconomic conditions. We also found that government economic policies had a statistically insignificant effect on the change in NPLs. The unpredictability, severity, and scale of the pandemic posed challenges for tailored government economic policies to effectively address the situation. This result aligns with the conclusions of Dunbar (2022). Additionally, the effectiveness of these policies may have been overshadowed by the combined force of significant capital accumulation facilitated by the banks following the GFC crisis, along with the implementation of QE measures. Similar to the findings reported by Cowling et al. (2022), as COVID-19 vaccinations increased, more borrowers were able to generate income, enabling them to meet their loan obligations, eventually reducing the NPLs. Additionally, the negative sign of the coefficient of the UNEMP during the post-pandemic period suggests that other mitigating factors, such

as government support measures and improving economic conditions as vaccinations increase (Table 3, empirical model 3), outweighed the immediate impact of the increased unemployment rate.

The results of Table 4 present the regression estimates with the inclusion of the CULTURE_PCA factor.

Regarding the total period of analysis (Table 4, empirical model 1), contrary to Ari et al. (2021), who anticipated a surge in NPLs, we observed a statistically insignificant effect of COVID19_DUMMY on the change in NPLs, while national culture was a statistically significant factor posing a negative effect on the change in NPLs. This implies that cultural-driven economies support economic growth, enabling debtors to effectively cope with their debt obligations. Adding to the results of Table 3, regarding the total period of analysis, debtors have continued to effectively meet their loan obligations, despite the challenges posed by the pandemic, translating into an outcome where the effect of the pandemic on bank stability remained statistically insignificant. This finding is consistent with the work of Demir and Danisman (2021), who stressed the crucial role of strong capital buffers. We also noticed that incorporating the CULTURE_PCA variable into our analysis reduced the effect of COVID19_DUMMY on the change in NPLs. This finding underscores the importance of cultural-driven economies in maintaining financial stability.

Regarding the pre-COVID-19 period, we did not find any statistically significant effect of national culture on economic growth and the change in NPLs. In the post-COVID-19 period, we observed a positive effect of national culture on bank capital, bank profitability, and economic growth, implying that borrowers' commitment to national values resulted in economic expansion and, consequently, increased bank capital and bank profitability. This finding aligns with the conclusions of Gaganis et al. (2020), who found that cultural factors significantly influenced financial stability and economic performance. Better capitalized banks reporting high profitability ratios could easily absorb the negative spillover effects of COVID-19 and avert a new wave of NPLs. Additionally, we found that the implementation of QE measures (differentiated variable: ASSET_TO_GDP) in cultural-driven economies led to a significant NPL reduction.

The pandemic introduced unparalleled economic uncertainty (Yi et al. 2022). Also, the pandemic's impacts, as well as the economic support policies implemented to mitigate the pandemic's economic effect, were not uniform across European countries and cultures. This dynamic interplay caused individuals and businesses to reassess their financial decisions and, consequently, their attitudes toward NPL repayment activities. Additionally, while in the pre-COVID-19 period the cultural norms were overshadowed by economic factors and the regulatory environment, during the lockdown period of COVID-19, debt repayment was primarily influenced by the inherent cultural values.

5.3. Subsample Analysis

Tables A5–A10 of Appendix A depict the empirical results, distinguishing by European subregion, core, peripheral European countries, NPL type, and NPL economic sector. While the baseline estimations yielded encouraging results, the subsample analysis revealed the specific arrears being affected, ultimately experiencing an increase in their NPLs. Sections 5.3.1 and 5.3.2 summarize the key findings.[10]

5.3.1. The Entire Period

From Table A5 (MODELS 1–7), we found that COVID19_DUMMY did not exert a significant effect on NPLs. Consistent with the findings of Makri et al. (2014), the unemployment rate was significant and exerted a positive effect on the change in NPLs. The change in NPLs of the prior period was significant and exerted a positive effect on the change in NPLs of the current period. The net purchases at book value (PEPP_PURCHASES) variable was significant and exerted a negative effect on the change in NPLs. This finding is supported by Yi et al. (2022), who emphasized the positive impact of QE policies on

financial stability during the pandemic. Bank capital was significant and exerted a positive effect on the change in NPLs.

5.3.2. Pre-COVID-19 Period

From Panel A (Tables A6–A8) of Appendix A, we observed that South Europe was the most vulnerable to external macroeconomic forces. Similar to the findings of Demir and Danisman (2021), we also observed that core European economies with high profitability ratios were more resilient. The mortgage NPLs (NPL_RATIO_MORT), and the NPLs related to small and medium-sized enterprises (SMEs), non-financial corporations (NPL_RATIO_NFCs), households (NPL_RATIO_HHs), and commercial real estate (CRE), were found to be vulnerable to external macroeconomic shocks. Notably, NPL_RATIO_CRE, NPL_RATIO_SME, and NPL_RATIO_NFCs NPL portfolios are well capitalized, offering a buffer against potential macroeconomic turbulences. This observation is supported by Bitar and Tarazi (2022), who emphasized that higher capitalization ratios help banks absorb economic shocks more effectively.

5.3.3. Post-COVID-19 Period

From Table A5 (Model 7), Panel B (Tables A6–A8), as well as Tables A9 and A10 of Appendix A, we derived that the NPLs were negatively affected by the increase in COVID-19 deaths (Rizwan et al. 2020). The presence of QE measures enhanced the banks' capital, preventing a new wave of NPLs, consistent with the observations of Yi et al. (2022). Core economies fared better in comparison to peripheral economies due to a sounder financial system (Apergis 2022). The results of Table A8 indicate that the strictness of lockdown measures hindered the ability, in particular, of SMEs, to repay the loans, unlike larger firms. This was in line with the findings of Cowling et al. (2022). The findings presented in Table A9 suggest that sectors that were considered essential and continued their operations during lockdown periods were not as severely affected, whereas sectors involving physical work-related activities experienced an increase in their NPLs due to the strictness of lockdown measures. Those sectors were the following: "agriculture, forestry, and fishing" (NFCNPL_AGR), "education" (NFCNPL_EDU), "information and communication" (NFCNPL_INF), "manufacturing" (NFCNPL_MAN), "professional, scientific, and technical activities" (NFCNPL_PRF), "accommodation and food service activities" (NFCNPL_ACC), "administrative and support service activities" (NFCNPL_ADM), and "human health services and social work activities" (NFCNPL_HUM). These findings are in line with Sharif et al. (2020), who stated that the pandemic may be viewed as an economic crisis, implying the differential impacts of the pandemic on various economic sectors. Moreover, from Table A5 (Model 7), we also found that the banks' securitization strategy was statistically significant and reduced the NPLs.

Regarding the role of national culture, from Table A10 we deduced that cultural influences in central European economies exerted a positive impact on borrowers' willingness to fulfill their loan commitments, ultimately leading to a decrease in the NPLs. Borrowers from southern European economies, with strong cultural ties, were more likely to get vaccinated against COVID-19, which in turn revitalized the economy and resulted in a decrease in NPLs. Northern European economies benefited from a strong cultural identity, which contributed to economic prosperity, bank profitability, and reduced NPLs. Culture had a significant negative effect, particularly in SME NPL portfolios. There was a statistically significant relationship between national culture and borrowers' willingness to receive a COVID-19 vaccine in various NPL sectors, which implies increased borrower cash flows and a subsequent reduction in NPLs associated with these sectors. Notably, we deduced a significant negative effect, particularly in the NPLs of the "electricity, gas, steam, and air conditioning supply" sector (NFCNPL_ELE).

Based on these findings, we also deduced that in countries where tradition and benevolence are prevalent, policies that emphasize social responsibility and community welfare are likely to be more effective. Additionally, banks should incorporate cultural

assessments into their risk management frameworks, tailoring financial products and services to align with the cultural values of their customers to enhance borrower loyalty and reduce default rates. Community-based financial education programs that resonate with local cultural values can improve financial literacy and behaviors, thereby reducing non-performing loans (NPLs). Moreover, promotional strategies that emphasize the alignment of financial products and policies with cultural norms can increase the adoption of financial products and improve compliance with repayment obligations.

6. Robustness Tests

The results reported in the previous section were based on the application of the fixed-effects method for the entire sample period. First, regarding the variation in sample size between the dependent variable (684 observations) and the other variables in our empirical estimates, we conducted sensitivity analyses to assess the potential impact on our findings. This involved systematically testing our models with various subsamples and configurations. These sensitivity tests considered scenarios where we first included and then excluded certain quarters and countries to gauge the robustness of our results to changes in sample composition. The sensitivity analyses reaffirmed the stability of our key findings.

For robustness, we also proceeded by estimating alternative econometric models. Specifically, we first regressed each independent variable against the dependent variable. We then proceeded by successively including each independent variable, while regressing with the change in NPLs. Those models confirmed the subsample analysis, as reported in Section 5.3. They also provided additional insights and helped mitigate the concerns related to the smaller sample size in the post-COVID-19 period.[11] It was confirmed that banks' securitization strategy was statistically significant and positively associated with NPL reduction of all NPL portfolios, except HH NPLs. It was derived that bank risk indicators, such as risk capital, operational risk, and risk-weighted assets (RWA), were statistically significant and exerted a positive effect on NPLs. A rise in the NPLs due to the increased COVID-19 deaths in South Europe was averted due to the government's financial support. Additionally, a rise in HH and MORT NPLs was averted due to the government's financial aid, which enabled the debtors to continue meeting their loan repayment obligations. On the other hand, the other NPL types relied on strong capitalization, high profitability, and QE measures. Although the MORT NPL portfolio was covered with enhanced provisioning, HH NPLs exhibited increased risk exposure (results available upon request).

We also conducted the same empirical analysis by excluding an important economic center, the United Kingdom, from the period 2020Q1 to 2021Q4. The analysis revealed that the magnitude of the coefficients and the significant indicators slightly increased. This indicates that, even without the United Kingdom, the remaining European countries had enough financial strength to handle the negative economic spillovers of COVID-19.[12] The third robustness test was related to the dependent variable. More specifically, we conducted a series of empirical estimations using the NPL ratio from the EBA database as an alternative response variable. The derived results confirmed the findings obtained from the initial empirical models.[13]

Additionally, we conducted a series of robustness checks to validate our findings regarding the effect of national culture on NPLs. We calculated the average of the ten Schwartz national culture dimensions for each country and period (Schwartz 1994) and performed the same analysis. We also independently employed each Schwartz cultural dimension for both the pre- and post-COVID-19 periods. Our robustness checks confirmed the pre-COVID-19 period results of Table 4. Moreover, in the post-COVID-19 period, all national cultural values were found to negatively affect the change in NPLs, with tradition (IMPTRAD), benevolence (IPEQOPT), power (IPRULE), and security (IPSTRGV) showing the most significant negative effects. This implies that adherence to national traditions, rules, and feelings of safety and security were associated with lower NPL ratios. Banks operating in countries with these cultural values could tailor their financial products and

repayment plans to align with prudence and security, thereby reducing default risks (results not reported due to space limitations).

As an alternative methodology, we applied stepwise regression (forward). The results are reported in Table 5. Despite some differences in the magnitude of the coefficients, the results confirmed the findings of Table 4.

To address the issue of endogeneity in terms of policy responses and confirm the validity of the baseline estimations, we utilized the Arellano and Bond (1991) difference GMM method (Hansen 1982) for dynamic panels by employing the dependents' variable one lag period as an instrumental variable, since the current NPLs are also a byproduct of the NPLs of the prior period, making the lagged dependent variable an appropriate instrument to account for endogeneity. Furthermore, we employed the second lag of control variables as additional instrumental variables, enhancing the exogenous variation in our model and the causal relationship between the policy responses and the growth of NPLs. The empirical results of GMM were reported to be quite similar in terms of the magnitude and sign of the coefficients to the empirical results reported in Sections 5.2 and 5.3. This implies that the primary methodology employed was robust and effectively addressed endogeneity that may arise due to reverse causality and omitted variable bias. GMM results supported our baseline estimations and highlighted that peripheral economies were able to withstand the negative economic spillovers of COVID-19 due to the combination of capital accumulation and government economic support, while core economies were able to quickly recover from the pandemic due to sounder financial systems, enabling them to respond with a faster speed and a better solution to COVID-19. To validate the GMM model's results, we used the J-Test for over-identification restrictions, which was found to be valid. As an additional alternative methodology, we also applied Robust Least Squares (RLS), which yielded similar results to the prior section (the empirical estimates of GMM and RLS are not reported due to space limitations).[14] Furthermore, we included interaction terms to capture the interplay between 'bank capital'–'government economic support', 'bank capital'–'QE policy measures', 'securitization'–'government economic support', and 'cultural identity'–'GDP growth' and the growth of NPLs. The interaction terms analysis validated our findings that peripheral economies exhibited resilience against the pandemic's economic spillovers due to the synergy between capital accumulation and government economic support. Welch's *t*-tests and Kruskal–Wallis tests were conducted to compare the means of the subsamples analyzed, indicating significant differences between the means and, therefore, reinforcing our earlier findings related to the combined impact of securitization, wealth, and government economic support on the growth of NPLs.

Finally, as an alternative research approach, we also followed a difference-in-differences (DID) research approach to investigate the effects of the COVID-19 pandemic on the change in NPLs by comparing changes over time between two groups. In this approach, we created a treatment group representing the post-COVID-19 period and a control group representing the pre-COVID-19 period. Following this strategy, we derived that in the treatment group, the change in NPLs continued to decrease, compared to the control group, further strengthening the validity of our primary pre- and post-COVID-19 research approach. We also excluded outlier periods characterized by extreme values in key variables, such as NPLs, COVID-19 deaths, and government response indices. Specifically, quarters with Z-scores greater than 3 or less than -3 for these variables were removed from the analysis. After excluding these outliers, we found that our results remained consistent, suggesting that our findings were not driven by these extreme values. Lastly, we also performed a rolling window analysis with an eight-quarter window to observe the stability of our results over time. The rolling window analysis confirmed that the relationships between COVID-19 measures, economic support policies, and NPLs were stable across different sub-periods, further validating the robustness of our findings (robustness tests available upon request).

7. Conclusions and Future Research

This paper examined the effects of the COVID-19 pandemic on the European Union's NPLs. This research is the first to analyze this effect by European subregion, on country-level prosperity, distinguishing NPL type and NPL economic sector.

Our empirical results indicated that the extensive loan disbursements during the pre-pandemic period contributed to the rise in NPLs. This suggests that European banks should establish additional risk auditing policies. Despite the adverse economic spillovers of COVID-19, the accumulation of bank capital after the GFC, along with the government and central bank economic support provided, resulted in a substantial NPL reduction. Specifically, we found that peripheral economies were able to withstand the negative economic spillovers of COVID-19, primarily due to the combination of capital accumulation and government economic support. On the other hand, core economies were able to quickly recover due to their robust profitability ratios. The successive lockdowns particularly affected the NPL growth of SMEs, while larger firms performed better. In line with Dunbar (2022), households were able to continue meeting their loan repayment obligations due to the government's financial support. Additionally, in line with Cowling et al. (2022), physical work-related activities were severely affected by the successive lockdowns, resulting in higher NPLs, while vital sectors that continued their normal operations were not affected. In line with Cicchiello et al. (2022), while vaccinations increased, NPLs decreased, enabling a functional economy and leading to high loan repayment rates. Additionally, bank risk indicators increased dramatically during the pandemic, suggesting the need for the implementation of new and effective risk management practices. Finally, we also concluded that even during the pandemic, the brutal securitization strategy that banks pursued, along with the economic support policies, resulted in a substantial decrease in NPLs.

This study was also innovative by being the first to highlight the effect of cultural values on both borrowers' and lenders' behavior. More specifically, borrowers in culturally driven countries encourage innovation and competitiveness, ultimately boosting the economy. Despite the increased levels of economic uncertainty, we provided evidence that the rate of debt repayment increased in conjunction with cultural values, ultimately reducing the NPLs.

Policymakers and financial institutions can use these insights to mitigate the impact of future economic shocks by enhancing risk auditing policies, encouraging capital accumulation, implementing dynamic stress testing, and providing targeted support for SMEs and vulnerable sectors. By understanding and leveraging cultural factors, financial policies can be more effectively tailored to promote economic resilience and stability. Moreover, centralized support mechanisms, continuous monitoring and dynamic adaptation of economic policies, coordination between monetary and fiscal policies, as well as the implementation of advanced risk management practices, are essential in preparing for and responding to future crises. These measures, combined with robust securitization frameworks, can significantly reduce the risk of NPLs and maintain financial stability during economic downturns.

Future studies could examine the effect of COVID-19 on NPLs utilizing additional candidate predictors. They could also examine the relationship between environmental (E), social (S), and governmental (G) factors and NPLs. Moreover, they could extend the temporal coverage by including recent economic events, such as the geopolitical conflict between Russia and Ukraine. Finally, they could also examine the effect of the energy crisis on the NPLs or conduct a county-level analysis, considering the cultural identity.

Finally, this research provided robust results for both scientific and policymaking purposes. This research is also expected to pave the way for a new branch of literature related to the factors affecting the NPLs, ultimately leading to a revised strategy for resolving NPLs, not only for Europe but also on a global scale.

Author Contributions: J.H.P.: Conceptualization, Investigation, Writing—Original Draft, Validation, Visualization. D.K.: Conceptualization, Supervision, Writing—Review and Editing, Validation,

Visualization. G.A.S.: Conceptualization, Investigation. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: Data will be made available on request.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Country sample.

Country	Observation per Country	Cumulative Observation Count	Subregion Categorization	Core/Periphery Categorization
Denmark	28	28	Northern Europe	Intermediate group
Spain	28	56	Southern Europe	Extended Periphery
United Kingdom	28	84	Northern Europe	Intermediate group
France	28	112	Southern Europe	Hard-Core group
Italy	28	140	Southern Europe	Extended Periphery
Ireland	28	168	Northern Europe	Extended Periphery
Finland	28	196	Northern Europe	Extended Periphery
Portugal	28	224	Southern Europe	Extended Periphery
Sweden	28	252	Northern Europe	Intermediate group
Greece	28	280	Southern Europe	Extended Periphery
Austria	28	308	Central Europe	Hard-Core group
Belgium	28	336	Northern Europe	Hard-Core group
Germany	28	364	Central Europe	Hard-Core group
Netherlands	28	392	Central Europe	Hard-Core group
Bulgaria	28	420	Southern Europe	Extended Periphery
Croatia	28	448	Southern Europe	Extended Periphery
Czech Republic	28	476	Central Europe	Intermediate group
Estonia	28	504	Northern Europe	Intermediate group
Hungary	28	532	Central Europe	Extended Periphery
Latvia	28	560	Northern Europe	Intermediate group
Lithuania	28	588	Northern Europe	Intermediate group
Luxembourg	28	616	Central Europe	Intermediate group
Malta	28	644	Southern Europe	Extended Periphery
Poland	28	672	Central Europe	Intermediate group
Romania	28	700	Central Europe	Extended Periphery
Slovenia	28	728	Southern Europe	Intermediate group
Slovakia	28	756	Central Europe	Intermediate group
Cyprus	28	784	Southern Europe	Extended Periphery
Total	**784**	**784**	**-**	**-**

Notes: (1) This table presents the sample of countries that synthesize the data of our research, the observation distribution by country, their categorization per subregion, and core/peripheral economies. (2) The core/peripheral economies are distinguished based on the Phillips and Sul (2007) approach. The total number of country data points used in our research was 784 country observations.

Table A2. Data sources and description for the dependent variables.

Variable	Variable Role	Variable Group	Explanation	Source	Parameter Shown
NPLS	Main dependent variable	NPL Ratio	Aggregate non-performing loans to total gross loans	ECB	Percentage (%)
NPL_RATIO_HHS	Secondary Dependent variable	NPL Type	Aggregate non-performing loans to total gross loans—Households	EBA	Percentage (%)
NPL_RATIO_MORT	Secondary Dependent variable	NPL Type	Aggregate non-performing loans to total gross loans—Mortgages	EBA	Percentage (%)

Table A2. *Cont.*

Variable	Variable Role	Variable Group	Explanation	Source	Parameter Shown
NPL_RATIO_NFCS	Secondary Dependent variable	NPL Type	Aggregate non-performing loans to total gross loans—Non-financial corporations	EBA	Percentage (%)
NPL_RATIO_SME	Secondary Dependent variable	NPL Type	Aggregate non-performing loans to total gross loans—Small and medium-sized enterprises	EBA	Percentage (%)
NPL_RATIO_CRE	Secondary Dependent variable	NPL Type	Aggregate non-performing loans to total gross loans—Commercial real estate	EBA	Percentage (%)
NFCNPL_AGR	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—A: Agriculture, forestry, and fishing	EBA	Percentage (%)
NFCNPL_MIN	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—B: Mining and quarrying	EBA	Percentage (%)
NFCNPL_MAN	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—C: Manufacturing	EBA	Percentage (%)
NFCNPL_ELE	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—D: Electricity, gas, steam, and air conditioning supply	EBA	Percentage (%)
NFCNPL_WAT	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—E: Water supply	EBA	Percentage (%)
NFCNPL_CON	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—F: Construction	EBA	Percentage (%)
NFCNPL_WRT	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—G: Wholesale and retail trade	EBA	Percentage (%)
NFCNPL_TRA	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—H: Transport and storage	EBA	Percentage (%)
NFCNPL_ACC	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—I: Accommodation and food service activities	EBA	Percentage (%)
NFCNPL_INF	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—J: Information and communication	EBA	Percentage (%)

Table A2. *Cont.*

Variable	Variable Role	Variable Group	Explanation	Source	Parameter Shown
NFCNPL_FIN	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—K: Financial and insurance activities	EBA	Percentage (%)
NFCNPL_REA	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—L: Real estate activities	EBA	Percentage (%)
NFCNPL_PRF	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—M: Professional, scientific, and technical activities	EBA	Percentage (%)
NFCNPL_ADM	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—N: Administrative and support service activities	EBA	Percentage (%)
NFCNPL_PAD	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—O: Public administration and defense, compulsory social security	EBA	Percentage (%)
NFCNPL_EDU	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—P: Education	EBA	Percentage (%)
NFCNPL_HUM	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—Q: Human health services and social work activities	EBA	Percentage (%)
NFCNPL_ART	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—R: Arts, entertainment, and recreation	EBA	Percentage (%)
NFCNPL_OTH	Secondary Dependent variable	NPL Economic Sector	Aggregate non-performing loans to total gross loans—Non-financial corporations—S: Other services	EBA	Percentage (%)

Notes: (1) This table presents the data, their explanation, as well as the data sources of the dependent variables used in this research. (2) All variables are depicted at an aggregated country level, whereas before they were employed for empirical testing, they were all transformed to first or second differences because of unit root testing.

Table A3. Data sources and descriptions of the candidate predictors and the control variables.

Variable	Variable Role	Variable Group	Explanation	Source	Parameter Shown
UNEMP	Control variable	Macroeconomic Variables	Percentage (%) of unemployment	DataStream	Percentage (%)
CPI	Control variable	Macroeconomic Variables	Quarterly Consumer Price Index	DataStream	No.
R_GDP_Q2Q	Control variable	Macroeconomic Variables	Quarterly percentage growth rate of real GDP	IMF	Percentage (%)
GDP_MARKET	Control variable	Macroeconomic Variables	Quarterly gross domestic product at market prices	Eurostat	No.

Table A3. *Cont.*

Variable	Variable Role	Variable Group	Explanation	Source	Parameter Shown
NPLS (-1)	Control variable	Bank-specific Variables	Previous quarter aggregate non-performing loans to total gross loans	ECB	Percentage (%)
ROA	Control variable	Bank-specific Variables	Return on assets: profit or loss for the year/total assets	DataStream	Percentage (%)
CAP	Control variable	Bank-specific Variables	Bank capital and reserves to total assets	DataStream	Percentage (%)
LOAN_DISBRS	Control variable	Bank-specific Variables	Loan disbursements to customers	DataStream	Percentage (%)
FINANCIAL_ASSETS	Control variable	Bank-specific Variables	Total financial instruments on the asset side	EBA	No.
PROVISIONS	Control variable	Bank-specific Variables	Impairments (credit risk losses)/equity	EBA	Percentage (%)
RISK_CAPITAL	Control variable	Bank-specific Variables	Total risk exposure amount for position, foreign exchange, and commodities risks/total risk exposure amount	EBA	Percentage (%)
OPER_RISK	Control variable	Bank-specific Variables	Total risk exposure amount for OpePercentage (%) ns/total risk exposure amount	EBA	No.
LIABILITIES	Control variable	Bank-specific Variables	Total deposits other than from banks/total liabilities	EBA	No.
CASH_BALANCES	Control variable	Bank-specific Variables	Cash positions/total assets	EBA	Percentage (%)
FINANCIAL_ASSETS	Control variable	Bank-specific Variables	Total financial instruments on the asset side	EBA	No.
EQUITY	Control variable	Bank-specific Variables	Equity instruments/total assets	EBA	Percentage (%)
TOTAL_ASSETS	Control variable	Bank-specific Variables	Total assets	EBA	No.
RETAINED_EARNINGS	Control variable	Bank-specific Variables	Retained earnings/Tier 1 capital volume	EBA	Percentage (%)
DERIVATIVES	Control variable	Bank-specific Variables	Derivatives/total assets	EBA	Percentage (%)
CRED_DEPOSITS	Control variable	Bank-specific Variables	Deposits from credit institutions/total liabilities	EBA	Percentage (%)
TIER1_CAP	Control variable	Regulatory Variables	Additional Tier 1 capital	EBA	No.
COVER_Percentage (%)	Control variable	Regulatory Variables	Accumulated impairment, accumulated negative changes in fair value due to credit risk for non-performing loans and advances/total gross non-performing loans and advances	EBA	Percentage (%)
RWA_VOLUME	Control variable	Regulatory Variables	RWA volume	EBA	No.
OWN_FUNDS_TIER1	Control variable	Regulatory Variables	Tier 1 capital volume	EBA	No.
SECURITIZATION	Control variable	Regulatory Variables	Securitization positions/risk-weighted exposure amounts for credit, counterparty credit, and dilution risks and free deliveries	EBA	Percentage (%)
PEPP_PURCHASES	Candidate predictor	Quantitative Easing Variables	Net purchases at book value	ECB	No.
ASSET_TO_GDP	Candidate predictor	Quantitative Easing Variables	Total assets/quarterly gross domestic product at market prices	ECB	Percentage (%)

Table A3. *Cont.*

Variable	Variable Role	Variable Group	Explanation	Source	Parameter Shown
QE_ANNOUNCEMENT	Candidate predictor	Quantitative Easing Variables	Quantitative Easing (QE) Announcement: 1 Corresponding to Dates: 18 March 2020 and 4 June 2020.	(Hoang et al. 2021)	Binary (1/0)
EXP_ASSET_PURC	Candidate predictor	Quantitative Easing Variables	Expanded Asset Purchase Program (APP)	ECB	No.
BOND_PURC	Candidate predictor	Quantitative Easing Variables	Covered bonds purchases at book value (CBPP3)	ECB	No.
COVID19_DUMMY	Candidate predictor	COVID-19 Variables	COVID-19 pandemic existence	Author's Calculations	Binary (1/0)
COVID19_VACCINATED	Candidate predictor	COVID-19 Variables	COVID-19 vaccinated population	DataStream	No.
COVID19_DEATHS	Candidate predictor	COVID-19 Variables	COVID-19 deaths	DataStream	No.
CONTNMN	Candidate predictor	COVID-19 Government Response Variables	Government response containment index	DataStream	Index
GOVT_RESP_STR	Candidate predictor	COVID-19 Government Response Variables	Government response stringency index	DataStream	Index
GOVT_ECON_SUP	Candidate predictor	COVID-19 Government Response Variables	Government response economic support index	DataStream	Index

Notes: (1) This table presents the data, their explanation, as well as the data sources of the candidate predictors and the control variables employed. (2) All variables are depicted at the aggregated country level, whereas before they were employed for empirical testing, they were transformed to first or second differences because of unit root testing.

Table A4. Data sources and descriptions of the cultural dimensions.

Literature	Variable Symbol	Cultural Dimensions	Short Definition	ESS (European Social Survey) Question	Values/Answer Range from ESS (European Social Survey)	
Schwartz National Culture Values (Schwartz 1994)	ipcrtiv	Self-direction	Independent thought and action	Important to think new ideas and be creative	Value	Category
	ipgdtim	Stimulation	Excitement, novelty, and challenge in life	Important to have a good time	1	Very much like me
	ipudrst	Hedonism	Pleasure or sensuous gratification for oneself	Important to understand different people	2	Like me
	ipshabt	Achievement	Personal success through demonstrating competence according to social standards	Important to show abilities and be admired	3	Somewhat like me
	ipfrule	Power	Social status, prestige, control, or dominance	Important to do what is told and follow rules	4	A little like me
	ipstrgv	Security	Safety, harmony, and stability of society, of relationships, and of self	Important that government is strong and ensures safety	5	Not like me
	ipbhprp	Conformity	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms	Important to behave properly	6	Not like me at all
	imptrad	Tradition	Respect, commitment, and acceptance of the customs and ideas that one's culture or religion provides	Important to follow traditions and customs	7	Refusal *

Table A4. *Cont.*

Literature	Variable Symbol	Cultural Dimensions	Short Definition	ESS (European Social Survey) Question	Values/Answer Range from ESS (European Social Survey)	
Schwartz National Culture Values (Schwartz 1994)	ipeqopt	Benevolence	Preserving and enhancing the welfare of those with whom one is in frequent personal contact	Important that people are treated equally and have equal opportunities	8	Don't know *
	impenv	Universalism	Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature	Important to care for nature and environment	9	No answer *
Author's Calculations	CULTURE_PCA	National Cultural Identity Variable	Percentage (%)	Cultural Identity	(*) Missing Value	

Notes: (1.) This table presents the data, their explanation, as well as the data sources of the variables employed. The variables depicted in this table are related to the Schwartz (1994) cultural dimensions, as derived from the European Social Survey (ESS). More specifically, the second column refers to the name of the cultural value, the third column provides a short description of the respective cultural dimension, the fourth column depicts the ESS question, from which the data for each variable were derived, the fifth column represents the name of the variable, as depicted in the ESS survey, and finally, the last column depicts the respective questions represented in the ESS survey for each cultural dimension. (2.) The asterisk * corresponds to missing values in the European Social survey (ESS). (3.) All variables are depicted at the aggregated country level. No unit root testing was implemented for those variables since those variables were not directly used in the empirical estimations. Instead, we proceeded by forming a new cultural dimension variable, by utilizing principal component analysis (PCA) methodology (=CULTURE_PCA). More specifically, the variable presented in the last row of the above table was calculated utilizing the PCA and was not derived from the ESS survey. Instead, this variable was the culmination of the Schwartz (1994) cultural dimensions.

Table A5. Regression results for total sample.

This Table Presents the Empirical Results Related with the Total Sample of Analysis (2015Q1–2021Q4) as Well as the Post-COVID-19 Period (2020Q1–2021Q4)								
Regression Results—Total Sample and Post-COVID-19 Period		**Dependent Variable**						
		Total Period: 2015Q1–2021Q4						**Post-COVID-19 Period: 2020Q1–2021Q4**
Total Period Analysis		**MODEL (1)**	**MODEL (2)**	**MODEL (3)**	**MODEL (4)**	**MODEL (5)**	**MODEL (6)**	**MODEL (7)**
Variable Group	**Variable Symbol**	**D(NPL_RATIO_CRE)**	**D(NPL_RATIO_HHS)**	**D(NPL_RATIO_MORT)**	**D(NPL_RATIO_NFCS)**	**D(NPL_RATIO_SME)**	**D(NPLS)**	**D(NPLS)**
Macroeconomic Variables	D(UNEMP(-1))	0.001179	0.000583	0.000565	0.000917	0.000928	0.002346 ***	0.006601
	D(CPI(-1))						−0.000506	−0.001593
	R_GDP_Q2Q(-1)	−0.000444	−0.000288	−0.000272	−0.000368	−0.000450	−0.000135	0.002676
Bank-specific Variables	D(NPLS(-1))						0.690926 ***	−0.674424 ***
	D(NPL_RATIO_CRE(-1))	0.798120						
	D(NPL_RATIO_HHS(-1))		0.832194					
	D(NPL_RATIO_MORT(-1))			0.830631				
	D(NPL_RATIO_NFCS(-1))				0.791745			
	D(NPL_RATIO_SME(-1))					0.812455		
	D(OPER_RISK,1)							2.536535 *
	RISK_CAPITAL						−0.000573	2.771233 *
	D(SECURITIZATION,1)						−0.000573	−2.804435 *
	D(TIER1_CAP,2)							−1.855125 **
	D(RWA_VOLUME,1)							0.009934 *
	D(TOTAL_ASSETS,1)	−0.000360	−0.000377	−0.000418	−0.000410	−0.000445	−0.000573	
	D(ROA(-1))						0.111898	−1.212907
	D(CAP(-1))						0.251789 ***	0.225163
	D(CAP,2)	0.001959	0.001511	0.001626	0.001581	0.001826	0.000688	
	D(LOAN_DISBRS(-1))						−0.008183	0.002465
Quantitative Easing Variables	PEPP_PURCHASES	-4.59×10^{-8}	-3.07×10^{-7}	-3.68×10^{-7}	-1.34×10^{-7}	-2.61×10^{-7}	-8.67×10^{-7} **	-7.45×10^{-2} *
	BOND_PURC	-5.00×10^{-5}	-2.77×10^{-5}	-2.52×10^{-5}	-4.01×10^{-5}	-4.57×10^{-5}	1.28×10^{-6}	
	EXP_ASSET_PURC	−0.001098	−0.000698	−0.000644	−0.000911	−0.001090	-8.64×10^{-5}	

Table A5. *Cont.*

This Table Presents the Empirical Results Related with the Total Sample of Analysis (2015Q1–2021Q4) as Well as the Post-COVID-19 Period (2020Q1–2021Q4)								
Regression Results—Total Sample and Post-COVID-19 Period		**Dependent Variable**						
		Total Period: 2015Q1–2021Q4						**Post-COVID-19 Period: 2020Q1–2021Q4**
Total Period Analysis		**MODEL (1)**	**MODEL (2)**	**MODEL (3)**	**MODEL (4)**	**MODEL (5)**	**MODEL (6)**	**MODEL (7)**
Variable Group	**Variable Symbol**	**D(NPL_RATIO_CRE)**	**D(NPL_RATIO_HHS)**	**D(NPL_RATIO_MORT)**	**D(NPL_RATIO_NFCS)**	**D(NPL_RATIO_SME)**	**D(NPLS)**	**D(NPLS)**
COVID-19 Variables	COVID19_DEATHS							−4.632856 *
	COVID19_DUMMY	−0.012205	−0.007001	−0.011405	−0.009049	−0.007541	0.041887	
Regression Main Statistics	R-squared	0.836537	0.841355	0.832740	0.823983	0.833629	0.987545	0.935943
	Adjusted R-squared	0.698222	0.707117	0.691212	0.675045	0.692853	0.977007	0.829180
	F-statistic	6.048053	6.267637	5.883921	5.532407	5.921688	9.370878	8.766596
	Prob(F-statistic)	0.001587	0.001335	0.001811	0.002426	0.001757	0.000000	0.000000
	Durbin–Watson stat	1.969687	1.972348	1.971576	1.970468	1.974364	1.930466	2.855695

Note(s): (1.) Table A5 presents the regression results related to both the total and post-COVID-19 periods. More specifically, Models 1 to 6 present the empirical results referring to the total period (2015Q1–2021Q4), while Model 7 presents the empirical results referring to the post-COVID-19 period (2020Q1–2021Q4). (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the *p*-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. (3.) The (-1) denotes one period lag. This note also applies to the subsequent tables. (4.) The variable NPLs stands for the aggregate non-performing loans to total gross loans; NPL_RATIO_CRE represents the commercial real estate NPLs to total gross loans (aggregate); NPL_RATIO_HHS stands for household NPLs to total gross loans (aggregate); NPL_RATIO_MORT stands for mortgage NPLs to total gross loans (aggregate); NPL_RATIO_NFCS represents the non-financial corporations' NPLs to total gross loans (aggregate); NPL_RATIO_SME represents the small and medium-sized enterprises' NPLs to total gross loans (aggregate); UNEMP stands for % of unemployment; CPI stands for quarterly consumer price index; R_GDP_Q2Q represents the quarterly percentage growth rate of real GDP; OPER_RISK stands for total risk exposure amount for operations/total risk exposure amount; RISK_CAPITAL denotes the total risk exposure amount for position, foreign exchange, and commodities risks/total risk exposure amount; SECURITIZATION represents the securitization positions/risk-weighted exposure amounts for credit, counterparty credit, and dilution risks and free deliveries; TIER1_CAP denotes the additional Tier 1 capital; RWA_VOLUME stands for RWA volume; TOTAL_ASSETS represents the total assets; ROA denotes the return on assets: profit or loss for the year/total assets; CAP represents the bank capital and reserves to total assets; LOAN_DISBRS stands for loan disbursements to customers; PEPP_PURCHASES represents the net purchases at book value; BOND_PURC stands for covered bonds purchases at book value (CBPP3); EXP_ASSET_PURC represents the Expanded Asset Purchase Program (APP); COVID19_DEATHS denotes the COVID-19 deaths; finally, COVID19_DUMMY stands for COVID-19 pandemic existence. (5.) Even though sample sizes are not included, the main statistics of the regression estimates imply that our empirical models demonstrated strong explanatory power. The high R-squared value and significant F-statistic reinforce the validity and reliability of the results. This note also applies to the subsequent tables. (6.) We opted not to include t-statistics since the inclusion of coefficient estimates and *p*-values effectively communicate the statistical significance of our results. This note also applies to the subsequent tables.

Table A6. Regression results for European subregions.

PANEL A. This Table Presents the Empirical Results for the European Subregions. The Period of Analysis Is the Pre-COVID-19 Period (2015Q1–2019Q4).							
PANEL A. Regression Results—European Subregions—Pre-COVID-19 Period		Dependent Variable					
		Pre-COVID-19: 2015Q1-2019Q4					
Subregional Analysis		**Central Europe**	**Northern Europe**	**Southern Europe**	**Central Europe**	**Northern Europe**	**Southern Europe**
		MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)	MODEL (5)	MODEL (6)
Variable Group	**Variable Symbol**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**
Macroeconomic Variables	D(UNEMP(-1))	−0.013766	0.006558	0.025692 *	−0.002803	0.007229	0.022256 **
	D(CPI(-1))	−0.005350	0.055737 *	−0.012663	−0.007320	0.014939	−0.012663
	R_GDP_Q2Q(-1)	0.033917	0.038799 ***	0.148603	−0.012171	0.022272	0.039282
	D(GDP_MARKET,1)	-1.76×10^{-5}	1.40×10^{-5}	2.95×10^{-6}			
Bank-specific Variables	D(NPLS(-1))	0.269035	−0.285082 **	−0.391149 **	0.269035	−0.158322	−0.427347
	D(ROA(-1))	0.065223	0.034237	−2.829566 **	0.065223	0.034237	0.773295
	D(CAP(-1))	−0.582087	−0.076389	−1.438326	−0.135500	−0.293470	−0.355399
	D(LOAN_DISBRS(-1))	−0.006321	0.001447	−0.009063	−0.038671 ***	0.016848	0.007029
	D(PROVISIONS,1)	−3.839253	−3.145415	−7.427375			
	RISK_CAPITAL	−2.266459	−7.837162	−4.265118			
	D(OPER_RISK,1)	0.432963	−4.806479	−4.247923			
	D(LIABILITIES,1)	−0.018438	0.001512	0.028989			
	D(CASH_BALANCES,1)	−4.410540	−3.112317	−5.875817			
	D(FINANCIAL_ASSETS,1)	0.014633	−0.001524	−0.032837			
	D(EQUITY)	−4.167760	−2.249403	2.292337 **			
	D(RETAINED_EARNINGS,1)	−0.645146	−0.529536	−1.352197 **			
	D(DERIVATIVES,2)	−7.736273	−9.068875	6.795368 ***			
	D(CRED_DEPOSITS,1)	−2.575671	−8.317736	9.037572 *			
Regulatory Variables	D(TIER1_CAP,2)	0.041501	−0.302660	0.080518			
	D(COVER_RATIO,2)	0.661557	−2.656202	1.833429 **			
	D(RWA_VOLUME,1)	−0.000586	-4.85×10^{-5}	−0.000966			
	D(OWN_FUNDS_TIER1(-1),1)	0.008595	−0.000198	−0.003130			
	D(SECURITIZATION,1)	−7.580479	−8.324792	−5.782130			
Regression Main Statistics	R-squared	0.900685	0.669831	0.942711	0.351186	0.588546	0.835070
	Adjusted R-squared	−1.681505	0.273628	0.721740	−0.197811	0.358132	0.695514
	F-statistic	0.348807	1.690627	4.266221	0.639686	2.554299	5.983770
	Prob(F-statistic)	0.897632	0.091925	0.026995	0.767729	0.019794	0.001671
	Durbin-Watson stat	2.449610	1.750368	2.499906	2.220722	1.649272	1.861230

PANEL B. This Table Presents the Empirical Results for the European Subregions. The Period of Analysis Is the Post-COVID-19 Period (2020Q1–2021Q4).				
PANEL B. Regression Results—European Subregions—Post-COVID-19 Period		Dependent Variable		
		Post-COVID-19: 2020Q1-2021Q4		
Subregional Analysis		Central Europe	Northern Europe	Southern Europe
		MODEL (1)	MODEL (2)	MODEL (3)
Variable Group	**Variable Symbol**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**
Macroeconomic Variables	D(UNEMP(-1))	0.000194	0.001718	−0.095467
	D(CPI(-1))	0.001380	0.000358	0.002404
	R_GDP_Q2Q(-1)	0.001591	0.000165	0.001966
Bank-specific Variables	D(NPLS(-1))	0.114139	0.078584	−0.914587 ***
	D(ROA(-1))	0.178231	−0.189340	−0.724560
	D(CAP(-1))	−0.128961	0.289453 ***	0.484247
	D(LOAN_DISBRS(-1))	0.006007	0.009299	0.006853
COVID-19 Variables	COVID19_VACCINATED	−0.007391 ***	0.002064	−0.143976 **
Regression Main Statistics	R-squared	0.445240	0.396354	0.871000
	Adjusted R-squared	−0.035552	0.010021	0.731250
	F-statistic	0.926056	1.025940	6.232562
	Prob(F-statistic)	0.550839	0.464432	0.001604
	Durbin-Watson stat	2.642044	2.190621	1.409280

Note(s): (1.) Table A6 presents the regression results related to the central, as well as north European subregions. More specifically, PANEL A presents the empirical results referring to the pre-COVID-19 period, while PANEL B presents the empirical results referring to the post-COVID-19 period. (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the *p*-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. (3.) The variable NPLs stands for the aggregate non-performing loans to total gross loans; UNEMP represents the % of unemployment; CPI represents the quarterly consumer price index; R_GDP_Q2Q stands for quarterly percentage growth rate of real GDP; GDP_MARKET stands for quarterly gross domestic product at market prices; ROA represents the return on assets: profit or loss for the year/total assets; CAP represents the bank capital and reserves to total assets; LOAN_DISBRS stands for loan disbursements to customers; PROVISIONS stands for impairments (credit risk losses)/equity; RISK_CAPITAL represents the total risk exposure amount for position, foreign exchange, and commodities risks/total risk exposure amount; OPER_RISK stands for total risk exposure amount for operations/total risk exposure amount; LIABILITIES denotes the total deposits other than from banks/total liabilities; CASH_BALANCES represents the cash positions/total assets; FINANCIAL_ASSETS denotes the total financial instruments on the asset side; EQUITY stands for equity instruments/total assets; RETAINED_EARNINGS represents the retained earnings/Tier 1 capital volume; DERIVATIVES denotes the derivatives/total assets; CRED_DEPOSITS represents the deposits from credit institutions/total liabilities; TIER1_CAP stands for additional Tier 1 capital; COVER_RATIO represents the accumulated impairment, accumulated negative changes in fair value due to credit risk for non-performing loans and advances/total gross non-performing loans and advances; RWA_VOLUME stands for RWA volume; OWN_FUNDS_TIER1 represents the Tier 1 capital volume; SECURITIZATION denotes the securitization positions/risk-weighted exposure amounts for credit, counterparty credit, and dilution risks and free deliveries; finally, COVID19_VACCINATED stands for COVID-19 vaccinated population.

Table A7. Regression results for European prosperity.

PANEL A. This table presents the empirical results for the Prosperity dimension. The period of analysis is the Pre-COVID-19 Period (2015Q1–2019Q4).							
PANEL A Regression Results—Prosperity—Pre-COVID-19 Period		Dependent Variable					
Core—Periphery		Hard-Core Country Group		Intermediate Country Group		Extended Periphery Country Group	
		MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)	MODEL (5)	MODEL (6)
Variable Group	**Variable Symbol**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**
Macroeconomic Variables	D(UNEMP(-1))	0.011557	−0.009357 ***	0.024228	−0.015295	−0.005513	−0.023370
	D(CPI(-1))	0.009861	0.001172	0.027906	0.013778	0.007535	0.000790
	R_GDP_Q2Q(-1)	−0.000169	3.81×10^{-5}	0.054228	0.007601	0.016925	0.038665
	D(GDP_MARKET,1)	-1.85×10^{-7}		1.74×10^{-6}		2.32×10^{-5}	
Bank-specific Variables	D(NPLS(-1))	0.400823	−0.561929 **	−0.142991 **	−0.288937 **	0.061585	−0.596344 ***
	D(ROA(-1))	−0.150535	−0.171537 **	0.155848	−0.051783	0.257572	−2.461562
	D(CAP(-1))	0.009861	0.150353	0.402339	−0.150981	−1.119386	−1.690986 **
	D(LOAN_DISBRS(-1))	−0.001410	−0.008798	−0.009894	0.000947	0.108287	0.039455
	D(PROVISIONS,1)	−2.167336		−3.437687		−3.303196	
	RISK_CAPITAL	−0.540978		−1.937135		−2.298918	
	D(OPER_RISK,1)	−0.778553		−4.675385		−1.184725	
	D(LIABILITIES,1)	−0.001180		2.14×10^{-5}		−0.089222	
	D(CASH_BALANCES,1)	−6.340108 **		−4.477762		−4.961550	
	D(FINANCIAL_ASSETS,1)	0.001218		3.96×10^{-5}		0.064814	
	D(EQUITY)	−8.068984		−4.959733		−1.091987	
	D(RETAINED_EARNINGS,1)	0.042142		−0.158886		0.770446	
	D(DERIVATIVES,2)	−3.186733		−1.114752		−3.608660	
	D(CRED_DEPOSITS,1)	−1.481367		−0.308019		−7.557611	
Regulatory Variables	D(TIER1_CAP,2)	0.112170		−0.226567		−0.454617	
	D(COVER_RATIO,2)	−2.815370		−2.034571		0.091373	
	D(RWA_VOLUME,1)	0.000232		0.000988		0.001412	
	D(OWN_FUNDS_TIER1(-1),1)	−0.000182		−0.001128		−0.005464	
	D(SECURITIZATION,1)	−6.982720		−2.651291		−4.707613	
Regression Main Statistics	R-squared	0.816686	0.618123	0.549040	0.638041	0.963809	0.759030
	Adjusted R-squared	0.109617	0.294996	0.007888	0.450821	0.022846	0.491285
	F-statistic	1.155030	1.912941	1.014577	3.407970	1.024279	2.834898
	Prob(F-statistic)	0.454674	0.132821	0.489720	0.002260	0.667778	0.066135
	Durbin-Watson stat	2.169879	1.812284	1.501292	2.290640	1.313388	1.706952

PANEL B. This Table Presents the Empirical Results for the Prosperity Dimension. The Period of Analysis Is the Post-COVID-19 Period (2020Q1–2021Q4).				
PANEL B Regression Results—Prosperity—Post-COVID-19 Period		Dependent Variable		
		Post-COVID-19: 2020Q1-2021Q4		
Core—Periphery		Hard-Core Country Group	Intermediate Country Group	Extended Periphery Country Group
		MODEL (1)	MODEL (2)	MODEL (3)
Variable Group	**Variable Symbol**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**
Macroeconomic Variables	D(UNEMP(-1))	−0.003286	−0.011902	−0.075901
	D(CPI(-1))	0.000860	0.001357	0.004810
	R_GDP_Q2Q(-1)	−0.000730	−0.000103	−0.010835
Bank-specific Variables	D(NPLS(-1))	−0.140869	−0.004967	−0.749663
	D(ROA(-1))	0.142126 **	0.090678	−0.487957
	D(CAP(-1))	−0.144226	0.090874	−1.531234
	D(LOAN_DISBRS(-1))	−0.011496	0.017691	−0.109999
Regulatory Variables	D(TIER1_CAP,2)	−4.418525	0.708464	−8.000965
	D(COVER_RATIO,2)	−2.616419	−3.864881 **	−3.686813
COVID-19 Variables	COVID19_VACCINATED	−0.009343	0.002023	−0.143110 **
Regression Main Statistics	R-squared	0.528754	0.382402	0.906250
	Adjusted R-squared	−0.028174	0.064245	0.765624
	F-statistic	0.949412	1.201930	6.444429
	Prob(F-statistic)	0.541448	0.315479	0.006610
	Durbin-Watson stat	2.335049	1.984339	1.199686

Note(s): (1.) Table A7 presents the regression results related to the core, as well as the peripheral countries. More specifically, PANEL A presents the empirical results referring to the pre-COVID-19 period, while PANEL B presents the empirical results referring to the post-COVID-19 period. (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the *p*-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$. (3.) The variable NPLs represents the aggregate non-performing loans to total gross loans; UNEMP represents the % of unemployment; CPI stands for quarterly consumer price index; R_GDP_Q2Q stands for quarterly percentage growth rate of real GDP; GDP_MARKET represents the quarterly gross domestic product at market prices; ROA represents the return on assets: profit or loss for the year/total assets; CAP stands for bank capital and reserves to total assets; LOAN_DISBRS stands for loan disbursements to customers; PROVISIONS represents the impairments (credit risk losses)/equity; RISK_CAPITAL stands for total risk exposure amount for position, foreign exchange, and commodities risks/total risk exposure amount; OPER_RISK denotes the total risk exposure amount for operations/total risk exposure amount; LIABILITIES represents the total deposits other than from banks/total liabilities; CASH_BALANCES denotes the cash positions/total assets; FINANCIAL_ASSETS stands for total financial instruments on the asset side; EQUITY represents the equity instruments/total assets; RETAINED_EARNINGS denotes the retained earnings/Tier 1 capital volume; DERIVATIVES represents the derivatives/total assets; CRED_DEPOSITS stands for deposits from credit institutions/total liabilities; TIER1_CAP represents the additional Tier 1 capital; COVER_RATIO stands for accumulated impairment, accumulated negative changes in fair value due to credit risk for non-performing loans and advances/total gross non-performing loans and advances; RWA_VOLUME represents the RWA volume; OWN_FUNDS_TIER1 denotes the Tier 1 capital volume; SECURITIZATION stands for securitization positions/risk-weighted exposure amounts for credit, counterparty credit, and dilution risks and free deliveries; finally, COVID19_VACCINATED stands for COVID-19 vaccinated population.

Table A8. Regression results for NPL type.

PANEL A. This Table Presents the Empirical Results per NPL Type. The Period of Analysis Is the Pre-COVID-19 Period (2015Q1–2019Q4).							
PANEL A Regression Results—NPL Type—Pre-COVID-19 Period		Dependent Variable					
NPL Type Analysis		MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)	MODEL (5)	MODEL (6)
Variable Group	**Variable Symbol**	**D(NPLS)**	**D(NPL_RATIO_CRE)**	**D(NPL_RATIO_HHS)**	**D(NPL_RATIO_MORT)**	**D(NPL_RATIO_NFCS)**	**D(NPL_RATIO_SME)**
Macroeconomic Variables	D(UNEMP(-1))	−0.014412 ***	0.004447 *	0.004028 *	0.003909 *	0.003590 *	0.004816 *
	D(CPI(-1))	−0.004359	−0.006894 *	−0.003656 *	−0.003369 *	−0.005314 *	−0.006599 *
	R_GDP_Q2Q(-1)	0.021946	0.001510	0.001451	0.001427	0.001649	0.002270
Bank-specific Variables	D(NPL_RATIO_CRE(-1))		−0.160619 ***				
	D(NPL_RATIO_HHS(-1))			−0.240182 *			
	D(NPL_RATIO_MORT(-1))				−0.243654 *		
	D(NPL_RATIO_NFCS(-1))					−0.167326 **	
	D(NPL_RATIO_SME(-1))						−0.185631
	D(ROA(-1))	−0.033750	−0.011243	0.000901	0.001561	−0.005135	−0.004125
	D(CAP(-1))	−0.388216 *	−0.038143 **	−0.016790	−0.014518	−0.026650 **	−0.029528 ***
	D(SECURITIZATION,1)		5.699070 *	4.843643 *	4.933218 *	4.301169 *	5.470455 *
	D(LOAN_DISBRS(-1))	0.018008 **	0.000427	−0.000102	−0.000174	0.000241	-1.13×10^{-5}
Regression Main Statistics	R-squared	0.705563	0.645273	0.688260	0.686605	0.677843	0.720262
	Adjusted R-squared	0.596847	0.514297	0.573155	0.570890	0.558893	0.582164
	F-statistic	6.489998	4.926644	5.979449	5.933580	5.698537	5.215574
	Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	Durbin-Watson stat	1.885753	2.582328	2.393623	2.391076	2.535094	2.639241

PANEL B. This Table Presents the Empirical Results per NPL Type. The Period of Analysis Is the Post-COVID-19 Period (2020Q1–2021Q4).							
PANEL B Regression Results—NPL Type—Post-COVID-19 Period		Dependent Variable					
NPL Type Analysis		MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)	MODEL (5)	MODEL (6)
Variable Group	**Variable Symbol**	**D(NPLS)**	**D(NPL_RATIO_CRE)**	**D(NPL_RATIO_HHS)**	**D(NPL_RATIO_MORT)**	**D(NPL_RATIO_NFCS)**	**D(NPL_RATIO_SME)**
Macroeconomic Variables	D(UNEMP(-1))	−0.045555 *	−0.000300	0.000116	0.000156	−0.000161	-9.26×10^{-5}
	D(CPI(-1))	−0.001392	-3.02×10^{-5}	5.55×10^{-7}	-5.91×10^{-6}	-1.70×10^{-5}	-5.81×10^{-6}
	R_GDP_Q2Q(-1)	−0.000562	8.21×10^{-7}	-2.30×10^{-5}	-1.58×10^{-5}	-1.11×10^{-5}	-9.82×10^{-6}
Bank-specific Variables	D(NPLS(-1))	−1011580 *					
	D(NPL_RATIO_CRE(-1))		−0.674931 *				
	D(NPL_RATIO_HHS(-1))			−1.739795 *			
	D(NPL_RATIO_MORT(-1))				−1.181618 *		
	D(NPL_RATIO_NFCS(-1))					−0.656276 *	
	D(NPL_RATIO_SME(-1))						−0.767985 *
	D(ROA(-1))	−0.240106	−0.004929	−0.006432 ***	−0.008763 **	−0.004389 ***	−0.005456
	D(CAP(-1))	0.465061 ***	-3.02×10^{-5}	0.001676	0.002876	0.004136 ***	0.004710
	D(LOAN_DISBRS(-1))	−0.020088	1.34×10^{-5}	5.55×10^{-5}	6.69×10^{-5}	5.17×10^{-5}	4.96×10^{-5}
	D(FINANCIAL_ASSETS,1)	−0.000822					
Quantitative Easing Variables	D(ASSET_TO_GDP)	−2.694894 **					
	D(QE_ANNOUNCEMENT)	−0.000822					
COVID-19 Variables	COVID19_VACCINATED		−0.000363 ***	−0.000272	−0.000277	−0.000234 ***	−0.000307 ***
COVID-19 Government Response Variables	GOVT_RESP_STR	3.76×10^{-7}	3.46×10^{-6} *	3.76×10^{-7}	8.09×10^{-8}	2.40×10^{-6} *	1.69×10^{-6} **
Regression Main Statistics	R-squared	0.748355	0.470007	0.557662	0.506621	0.631051	0.586299
	Adjusted R-squared	0.644502	0.288693	0.406336	0.337834	0.504832	0.444770
	F-statistic	7.205881	2.592234	3.685163	3.001533	4.999635	4.142598
	Prob(F-statistic)	0.000000	0.000701	0.000005	0.000107	0.000000	0.000001
	Durbin-Watson stat	2.097308	1.990526	0.867767	0.878659	2.153291	1.652758

Note(s): (1.) PANEL A presents the empirical results referring to the pre-COVID-19 period, while PANEL B presents the empirical results referring to the post-COVID-19 period. (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the *p*-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. (3.) The variable NPLs represents the aggregate non-performing loans to total gross loans; UNEMP represents the % of unemployment; CPI stands for quarterly consumer price index; R_GDP_Q2Q stands for quarterly percentage growth rate of real GDP; NPL_RATIO_CRE represents the commercial real estate NPLs to total gross loans (aggregate); NPL_RATIO_HHS represents the household NPLs to total gross loans (aggregate); NPL_RATIO_MORT stands for mortgage NPLs to total gross loans (aggregate); NPL_RATIO_NFCS stands for non-financial corporations' NPLs to total gross loans (aggregate); NPL_RATIO_SME represents the small and medium-sized enterprises' NPLs to total gross loans (aggregate); ROA stands for return on assets: profit or loss for the year/total assets; CAP denotes the bank capital and reserves to total assets; SECURITIZATION represents the securitization positions/risk-weighted exposure amounts for credit, counterparty credit, and dilution risks and free deliveries; LOAN_DISBRS denotes the loan disbursements to customers; FINANCIAL_ASSETS stands for total financial instruments on the asset side; ASSET_TO_GDP represents the total assets/quarterly gross domestic product at market prices; QE_ANNOUNCEMENT denotes the Quantitative Easing (QE) Announcement: 1 Corresponding to dates: 18 March 2020 and 4 June 2020; COVID19_VACCINATED represents the COVID-19 vaccinated population; finally, the variable GOVT_RESP_STR stands for government response stringency index.

Table A9. Regression results for NPL sector.

PANEL A. This Table Presents the Empirical NPL Sectoral Results. The Period of Analysis Is the Post-COVID-19 Period (2020Q1–2021Q4). Empirical MODELS 1 to 10 Are Presented for Economy of Space.											
PANEL A Regression Results—NPL Sector—Post-COVID-19 Period		Dependent Variable									
		Post-COVID-19: 2020Q1–2021Q4									
NPL Type Analysis		MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)	MODEL (5)	MODEL (6)	MODEL (7)	MODEL (8)	MODEL (9)	MODEL (10)
Variable Group	**Variable Symbol**	**D(NFCNPL_AGR)**	**D(NFCNPL_ART)**	**D(NFCNPL_CON)**	**D(NFCNPL_EDU)**	**D(NFCNPL_ELE)**	**D(NFCNPL_FIN)**	**D(NFCNPL_HUM)**	**D(NFCNPL_INF)**	**D(NFCNPL_MAN)**	**D(NFCNPL_MIN))**
Macroeconomic Variables	D(UNEMP(-1))	0.000567	−0.000175	−0.000175	−0.000147	-9.92×10^{-5}	0.000117	−0.000156	−0.000450 ***	−0.000145	0.000461
	D(CPI(-1))	−0.000154 **	-2.09×10^{-5}	-2.09×10^{-5}	-2.96×10^{-5}	1.69×10^{-5}	−0.000107	3.71×10^{-5}	-1.78×10^{-5}	-2.09×10^{-5}	-3.12×10^{-6}
	R_GDP_Q2Q(-1)	7.71×10^{-5}	-5.36×10^{-5}	-5.36×10^{-5}	-1.49×10^{-5}	-5.49×10^{-5} ***	−0.000127	-8.60×10^{-5}***	3.21×10^{-5}	1.80×10^{-6}	-1.58×10^{-5}
Bank-specific Variables	D(NFCNPL_AGR(-1)	−0.507225 *									
	D(NFCNPL_ART(-1)		−0.336184 *								
	D(NFCNPL_CON(-1)			−0.250137							
	D(NFCNPL_EDU(-1)				−0.397752 *						
	D(NFCNPL_ELE(-1)					−0.347851 *					
	D(NFCNPL_FIN(-1)						−0.376004 *				
	D(NFCNPL_HUM(-1)							−0.422962 *			
	D(NFCNPL_INF(-1)								−0.464776 *		
	D(NFCNPL_MAN(-1)									−0.762066 *	
	D(NFCNPL_MIN)(-1)										−0.168169
	D(ROA(-1))	−0.007102	−0.005355	−0.005355	−0.008331 ***	0.002382	−0.013318	−0.005936	−0.002028	−0.003229	−0.015687 ***
	D(CAP(-1))	0.010036	0.005510	0.005510	0.010548 **	3.86×10^{-5}	0.025841	0.005728	0.000372	0.005174 ***	−0.011644
	D(LOAN_DISBRS(-1))	0.000305	3.13×10^{-6}	3.13×10^{-6}	3.56×10^{-5}	-5.18×10^{-5}	−0.000143	0.000238	-9.97×10^{-5}	0.000327	0.000979 ***
COVID-19 Variables	COVID19_VACCINATED	−0.000394	−0.000201	−0.000201	-2.99×10^{-5}	4.71×10^{-5}	0.000528	0.000133	−0.000217	−0.000294 ***	0.000319
COVID-19 Government Response Variables	GOVT_RESP_STR	7.92×10^{-6} *	1.74×10^{-6}	1.74×10^{-6}	2.68×10^{-6} **	5.89×10^{-7}	3.19×10^{-6}	-2.13×10^{-6} ***	1.71×10^{-6} ***	2.10×10^{-6} **	-1.11×10^{-6}
Regression Main Statistics	R-squared	0.605971	0.305408	0.327182	0.382561	0.240557	0.229595	0.501099	0.711797	0.551537	0.325625
	Adjusted R-squared	0.471172	0.067785	0.097007	0.171332	−0.019252	−0.033965	0.330422	0.613201	0.398116	0.094917
	F-statistic	4.495360	1.285261	1.421452	1.811117	0.925899	0.871129	2.935950	7.219349	3.594917	1.411419
	Prob(F-statistic)	0.000000	0.199114	0.120823	0.024287	0.573029	0.644102	0.000144	0.000000	0.000000	0.125524
	Durbin–Watson stat	2.302737	2.230066	1.802728	2.387571	2.518205	2.558315	2.225116	2.508357	2.086867	1.992636

PANEL B. This table presents the empirical NPL sectoral results. The period of analysis is the Post-COVID-19 Period (2020Q1–2021Q4). Empirical MODELS 11 to 19 are presented for economy of space.										
PANEL B Regression Results—NPL Sector—Post-COVID-19 Period		Dependent Variable								
		Post-COVID-19: 2020Q1–2021Q4								
NPL Type Analysis		MODEL (11)	MODEL (12)	MODEL (13)	MODEL (14)	MODEL (15)	MODEL (16)	MODEL (17)	MODEL (18)	MODEL (19)
Variable Group	**Variable Symbol**	**D(NFCNPL_OTH)**	**D(NFCNPL_PAD)**	**D(NFCNPL_REA)**	**D(NFCNPL_PRF)**	**D(NFCNPL_WRT)**	**D(NFCNPL_TRA)**	**D(NFCNPL_WAT)**	**D(NFCNPL_ACC)**	**D(NFCNPL_ADM)**
Macroeconomic Variables	D(UNEMP(-1))	−0.000202	−0.000291	-9.75×10^{-5}	-5.82×10^{-5}	-6.88×10^{-5}	0.000174	1.26×10^{-5}	−0.001094 ***	2.49×10^{-5}
	D(CPI(-1))	-1.35×10^{-5}	−0.000144	1.06×10^{-6}	-4.38×10^{-5}	9.97×10^{-6}	2.83×10^{-5}	-1.40×10^{-5}	−0.000103 **	-5.34×10^{-5}
	R_GDP_Q2Q(-1)	8.21×10^{-5}	0.000279	3.26×10^{-5}	9.65×10^{-7}	-5.91×10^{-5}	-4.35×10^{-5}	-3.51×10^{-5}	8.33×10^{-5}	4.08×10^{-6}
Bank-specific Variables	D(NFCNPL_OTH(-1)	−0.627122 *								
	D(NFCNPL_PAD(-1)		−0.320885 *							
	D(NFCNPL_REA(-1)			−0.051564						
	D(NFCNPL_PRF(-1)				−0.423346 *					
	D(NFCNPL_WRT(-1)					−0.758765 *				
	D(NFCNPL_TRA(-1)						−0.383743 *			
	D(NFCNPL_WAT(-1)							−0.103849		
	D(NFCNPL_ACC(-1)								−0.339492 *	
	D(NFCNPL_ADM(-1)									−0.196234
	D(ROA(-1))	−0.004911	−0.019703	−0.003910	−0.003256	−0.002876	0.000996	−0.004275	0.006024	−0.006901
	D(CAP(-1))	−0.000148	0.020447	0.002607	0.008890	0.003934	0.002777	0.005790 **	0.002347	0.003552
	D(LOAN_DISBRS(-1))	−0.000509	4.50×10^{-5}	-1.44×10^{-5}	−0.000121	1.91×10^{-5}	0.000205	−0.000152	−0.000174	−0.000172

Table A9. *Cont.*

PANEL B. This table presents the empirical NPL sectoral results. The period of analysis is the Post-COVID-19 Period (2020Q1–2021Q4). Empirical MODELS 11 to 19 are presented for economy of space.										
PANEL B Regression Results—NPL Sector—Post-COVID-19 Period		Dependent Variable								
		Post-COVID-19: 2020Q1–2021Q4								
NPL Type Analysis		MODEL (11)	MODEL (12)	MODEL (13)	MODEL (14)	MODEL (15)	MODEL (16)	MODEL (17)	MODEL (18)	MODEL (19)
Variable Group	**Variable Symbol**	**D(NFCNPL_OTH)**	**D(NFCNPL_PAD)**	**D(NFCNPL_REA)**	**D(NFCNPL_PRF)**	**D(NFCNPL_WRT)**	**D(NFCNPL_TRA)**	**D(NFCNPL_WAT)**	**D(NFCNPL_ACC)**	**D(NFCNPL_ADM)**
COVID-19 Variables	COVID19_VACCINATED	0.000158	-3.92×10^{-5}	−0.000147	−0.000212	−0.000575 *	−0.000246 ***	−0.000196	0.000230	−0.000998 *
COVID-19 Government Response Variables	GOVT_RESP_STR	-1.07×10^{-6}	4.84×10^{-6}	1.18×10^{-6}	3.76×10^{-6} **	1.62×10^{-6}	6.89×10^{-7}	7.68×10^{-7}	6.87×10^{-6} *	2.79×10^{-6} ***
Regression Main Statistics	R-squared	0.623453	0.405312	0.551938	0.409734	0.567890	0.437779	0.400247	0.451692	0.352797
	Adjusted R-squared	0.494635	0.201866	0.398654	0.207801	0.420063	0.245440	0.195069	0.264113	0.131385
	F-statistic	4.839774	1.992235	3.600751	2.029057	3.841585	2.276082	1.950726	2.408007	1.593397
	Prob(F-statistic)	0.000000	0.010911	0.000007	0.009249	0.000003	0.003008	0.013133	0.001640	0.061077
	Durbin–Watson stat	2.091972	2.941706	2.348241	2.452917	1.952255	2.298212	1.767624	2.202710	1.823173

Note(s): (1.) PANEL B presents the NPL sectoral empirical estimation results, referring to the post-COVID-19pPeriod. (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the *p*-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. (3.) The variable NFCNPL_OTH represents the aggregate NPLs—non-financial corporations—S: Other services; NFCNPL_PAD represents the aggregate NPLs—non-financial corporations—O: Public administration and defense, compulsory social security; NFCNPL_REA stands for aggregate NPLs—non-financial corporations—L: Real estate activities; NFCNPL_PRF stands for aggregate NPLs—non-financial corporations—M: Professional, scientific, and technical activities; NFCNPL_WRT represents the aggregate NPLs—non-financial corporations—G: Wholesale and retail trade; NFCNPL_TRA represents the aggregate NPLs—non-financial corporations—H: Transport and storage; NFCNPL_WAT stands for aggregate NPLs—non-financial corporations—E: Water supply; NFCNPL_ACC stands for aggregate NPLs—non-financial corporations—I: Accommodation and food service activities; NFCNPL_ADM represents the aggregate NPLs—non-financial corporations—N: Administrative and support service activities; UNEMP stands for % of unemployment; CPI denotes the quarterly consumer price index; R_GDP_Q2Q represents the quarterly percentage growth rate of real GDP; ROA denotes the return on assets: profit or loss for the year/total assets; CAP stands for bank capital and reserves to total assets; LOAN_DISBRS represents the loan disbursements to customers; COVID19_VACCINATED denotes the COVID-19 vaccinated population; finally, GOVT_RESP_STR represents the government response stringency index.

Table A10. Regression estimates per European subregion, prosperity, NPL type, and NPL sector dimensions, with the inclusion of the CULTURE_PCA variable.

PANEL A. This Table Presents the Empirical Results per European Subregion, Prosperity, NPL Type, and NPL Sector Dimensions, with the Inclusion of the CULTURE_PCA Variable. The Period of Analysis Is the Post-COVID-19 Period (2020Q1–2021Q4).																	
PANEL A Regression results for dimensions with the inclusion of the CULTURE_PCA variable: Subregion/Prosperity/NPL Type/NPL Sector Dimensions—Post-COVID-19 Period		Dependent Variable															
Dimension		Subsample Analysis: Central Europe	Subsample Analysis: Northern Europe	Subsample Analysis: Southern Europe	Subsample Analysis: Prosperity (Hard-Core | Intermediate | Extended Periphery)			Subsample Analysis: NPL Type						Subsample Analysis: NPL Sector			
		Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4	Post-COVID-19: 2020Q1–2021Q4
		MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)	MODEL (5)	MODEL (6)	MODEL (7)	MODEL (8)	MODEL (9)	MODEL (10)	MODEL (11)	MODEL (12)	MODEL (13)	MODEL (14)	MODEL (15)	MODEL (16)
Variable Group	**Variable Symbol**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPLS)**	**D(NPL_RATIO_CRE)**	**D(NPL_RATIO_HHS)**	**D(NPL_RATIO_MORT)**	**D(NPL_RATIO_NFCS)**	**D(NPL_RATIO_SME)**	**D(NFC NPL_AGR)**	**D(NFC NPL_ART)**	**D(NFC NPL_CON)**	**D(NFC NPL_EDU)**	**D(NFC NPL_ELE)**
Macroeconomic Variables	D(UNEMP(-1))	−0.007931	0.011335	−0.111700 *	0.003481	0.006406	0.053175	0.001879	-6.89×10^{-5}	6.31×10^{-5}	−0.000329 **	−0.000326 **	0.000238	-6.76×10^{-5} *	-6.30×10^{-5}	-1.63×10^{-5} *	−0.000208
	D(CPI(-1))	0.001898	−0.007608	−0.019499 **	0.001383	−0.000461 ***	0.005369	-1.67×10^{-5}	-2.19×10^{-6}	7.42×10^{-6}	-6.53×10^{-5} **	-1.45×10^{-5}	-9.36×10^{-6}	-7.78×10^{-6}	3.51×10^{-5}	4.44×10^{-6}	-4.57×10^{-5} **
	R_GDP_Q2Q(-1)	0.002009	−0.004334 **	−0.004334 *	0.000253	−0.000215 **	−0.034766 **	-5.12×10^{-5} *	-1.56×10^{-5}	-7.21×10^{-6}	1.88×10^{-5}	−0.000349 ***	-5.58×10^{-6}	-1.17×10^{-6}	2.63×10^{-5}	8.68×10^{-7}	2.32×10^{-5}
Bank-specific Variables	Dep. Variable one lag *	0.464575	0.049432	−3.775014 ***	−0.863746 *	−0.246730	−1.815510	0.981349 ***	2083129 ***	1533147 ***	0.801145 ***	0.105791	−0.534687 *	−0.028861	0.130361	−1112437 ***	0.264846 *
	D(ROA(-1))	0.119711	−0.415089 ***	0.302717	−0.100564 *	−0.035518	−0.106373	−0.009202 *	−0.002407 *	−0.000588 *	−0.001405 **	−0.004141 **	−0.001777	−0.000458	0.000849	−0.000192 *	-7.87×10^{-5}
	D(CAP(-1))	−0.129604 *	0.072743	−0.457852	−0.011465	−0.074462	−7.204265 ***	−0.008419 *	−0.001205 *	−0.001692 *	0.002382 *	0.000753	−0.005993 **	8.83×10^{-5}	−0.003073 *	−0.000146	−0.002629
	D(LOAN_DISBRS(-1))	−0.034574	0.032301 *	−0.323045 *	0.051394 *	0.028744	0.242544	0.000381	3.00×10^{-5}	-3.65×10^{-5}	7.86×10^{-5}	0.000546	0.000467	-1.99×10^{-5}	-1.82×10^{-5}	-1.03×10^{-5}	3.9×10^{-5}
COVID-19 Government Response Variables	GOVT_RESP_STR	6.68×10^{-5}	0.000300 *	−0.000541 *	3628751	3159318 **	4671116 ***	0.919157 *	2676209 *	0.168257	0.973022 *	1.674120 **	0.694395 *	−0.374351	−2701637 **	−0.133923 *	0.762508 *
COVID-19 Variables	COVID19_VACCINATED	−0.009501 *	0.014544	−0.021299 *	−0.007642 *	−0.000959	−0.114527 *	−0.000249 ***	-6.55×10^{-5}	-3.1×10^{-5}	-5.19×10^{-5} **	-4.53×10^{-5} ***	2.98×10^{-5}	5.22×10^{-5} *	0.000158 *	-2.22×10^{-5}	−0.000138 **
Cultural Dimension Variables	CULTURE_PCA	0.037043 ***	−0.277838 *	−0.835484 *	−2104299 **	−0.013389 **	−2.946179 **	-6.49×10^{-6} *	−0.000118 *	-3.69×10^{-5} *	-7.52×10^{-5} *	−0.000767 ***	−0.000437 *	4.74×10^{-5}	−0.000303 *	2.97×10^{-6}	−0.000449 ***
Regression Main Statistics	R-squared	0.545894	0.810609	0.999153	0.960615	0.446338	0.969491	0.499017	0.897462	0.920342	0.569513	0.777499	0.671304	0.470087	0.517033	0.945442	0.198118
	Adjusted R-squared	0.405554	0.210872	0.992798	0.812922	−0.031825	0.870338	0.381139	0.881349	0.907824	0.394627	0.554999	0.342609	0.325187	0.320828	0.890885	0.009440
	F-statistic	1.641136	1.351608	1.572255	6.504124	0.933442	9.777706	4.233321	5.569747	7.352284	3.256491	3.494368	2.042329	1.871016	2.635.166	1732.921	1.050030
	Prob(F-statistic)	0.051928	0.075763	0.006337	0.041659	0.056696	0.020277	0.000130	0.000000	0.000000	0.003229	0.012823	0.096970	0.090358	0.012770	0.000002	0.020250
	Durbin–Watson stat	2.271937	2.005223	2.255409	2.112149	1.950082	1.457893	1.948111	1.535112	1.535685	2.259323	2.021428	2.025776	2.415203	1.614852	1.863350	2.449369

Table A10. *Cont.*

PANEL B. This table presents the empirical results per NPL SECTOR dimension, with the inclusion of the CULTURE_PCA variable. The period of analysis is the Post-COVID-19 Period (2020Q1–2021Q4).															
PANEL B Regression results for NPL sector dimension with the inclusion of the CULTURE_PCA variable–Post-COVID-19 Period		Dependent Variable													
Dimension		Subsample Analysis: NPL Sector													
		Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4	Post-COVID-19: 2020Q1-2021Q4
		MODEL (17)	MODEL (18)	MODEL (19)	MODEL (20)	MODEL (21)	MODEL (22)	MODEL (23)	MODEL (24)	MODEL (25)	MODEL (26)	MODEL (27)	MODEL (28)	MODEL (29)	MODEL (30)
Variable Group	**Variable Symbol**	**D(NFC NPL_FIN)**	**D(NFC NPL_HUM)**	**D(NFC NPL_INF)**	**D(NFC NPL_MAN)**	**D(NFC NPL_MIN))**	**D(NFC NPL_OTH)**	**D(NFC NPL_PAD)**	**D(NFC NPL_REA)**	**D(NFC NPL_PRF)**	**D(NFC NPL_WRT)**	**D(NFC NPL_TRA)**	**D(NFC NPL_WAT)**	**D(NFC NPL_ACC)**	**D(NFC NPL_ADM)**
Macroeconomic Variables	D(UNEMP(-1))	−0.000391 *	8.31×10^{-5}	0.000189	4.35×10^{-5}	1.80×10^{-5}	−0.000182	0.000107 **	−0.000717	2.82×10^{-5}	−0.000160	5.40×10^{-6}	-1.69×10^{-5}	-4.55×10^{-5}	0.000147
	D(CPI(-1))	1.53×10^{-6}	1.86×10^{-6}	-1.19×10^{-5}	2.36×10^{-5}	-3.10×10^{-5} ***	-4.81×10^{-5}	-3.47×10^{-6}	5.41×10^{-5}	1.65×10^{-5}	-2.67×10^{-5}	3.56×10^{-5}	-2.63×10^{-6}	−1.55 × 10^{-5}	−0.000343 **
	R_GDP_Q2Q(-1)	6.36×10^{-5}	-2.42×10^{-5} **	5.05×10^{-5}	-5.52×10^{-5} *	-3.15×10^{-7}	-7.68×10^{-5}	-2.42×10^{-5} **	0.000304	-2.16×10^{-5} *	−0.000238 **	6.26×10^{-5} **	-2.64×10^{-5}	1.05×10^{-5}	6.63×10^{-7}
Bank-specific Variables	Dep. Variable one lag *	0.456051 *	0.457979	0.334241	−0.328069 ***	−0.438023 ***	0.158705	0.859949 ***	1.079198 ***	−0.834081 ***	0.681852 *	−1.062127 ***	−0.549158 **	−0.379988	−0.487171
	D(ROA(-1))	−0.000366	0.001105 *	0.000567	0.001338	−0.000457 *	−0.004947 *	-4.57×10^{-6}	0.000216	0.001596	0.000774	0.000237	0.000200	0.000902	−0.009518 *
	D(CAP(-1))	−0.003463 *	0.000811	0.003319 ***	0.003320 *	−0.000639	−0.002034	−0.000316 *	0.002944	−0.001678	−0.003390	−0.004556 **	3.51×10^{-5} *	0.001617 **	−0.008479 *
	D(LOAN_DISBRS(-1))	−0.000125	4.56×10^{-5} *	1.32×10^{-5}	−0.000485 ***	-4.09×10^{-5}	0.000381	-7.39×10^{-5}	−0.002081 *	0.000104	0.000494	0.000719 *	-6.96×10^{-5}	−0.000389 **	0.001390
COVID-19 Government Response Variables	GOVT_RESP_STR	0.187973 *	0.294227 *	0.677779 **	−1.258017	6.409342 ***	−0.726005	0.140850 **	−1.307522	0.791880	−1.124358	8.066302	0.060199	−1.656750	4.252682
COVID-19 Variables	COVID19_VACCINATED	1.64×10^{-5}	-6.01×10^{-5} *	-2.82×10^{-5}	-3.35×10^{-5} *	−0.000124 ***	0.000181	8.28×10^{-6} *	2.24×10^{-5}	-7.76×10^{-5}	-8.56×10^{-5} *	−0.000631 *	5.28×10^{-5}	7.91×10^{-5}	−0.003825 **
Cultural Dimension Variables	CULTURE_PCA	−0.000120 *	−0.000109 *	0.000103	-8.92×10^{-5} *	−0.000131	-1.88×10^{-5}	-3.01×10^{-5} *	−0.000687 *	−0.004236	−0.000264 *	−0.002122 *	2.44×10^{-6}	0.000107	−0.012083 *
Regression Main Statistics	R-squared	0.497624	0.465839	0.334178	0.418653	0.628992	0.404087	0.559674	0.538699	0.364145	0.657442	0.809130	0.544230	0.720942	0.703607
	Adjusted R-squared	0.352909	0.348837	0.323687	0.330861	0.478271	0.393234	0.419347	0.477398	0.305829	0.314883	0.618259	0.488461	0.441884	0.407213
	F-statistic	1.624843	2.146698	1.235452	2.490588	4.173201	0.678097	1.271042	1.167781	1.409689	1.919211	4.239156	1.194091	2.583481	2.373894
	Prob(F-statistic)	0.129538	0.039114	0.091043	0.011063	0.000487	0.061679	0.029881	0.087859	0.008506	0.047440	0.005344	0.072296	0.043295	0.058736
	Durbin–Watson stat	1.467275	2.082264	2.282751	1.867849	2.051844	2.006813	1.321082	2.106355	1.933857	1.741933	1.870760	1.081447	1.835548	1.648639

Note(s): (1.) PANEL B presents the regression estimates related to the remaining NPL sectors, with the inclusion of the CULTURE_PCA variable for the post-COVID-19 period. (2.) OLS methodology was employed for the regression model estimation. More specifically, Fixed Corrected Panel Effects estimations with country-fixed effects were utilized for all models because of the Hausman test. The table presents the values of the coefficients, while the significance of the *p*-value is presented with an asterisk: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. (3.) The variable NFCNPL_FIN represents the aggregate NPLs—non-financial corporations—K: Financial and insurance activities; NFCNPL_HUM represents the aggregate NPLs—non-financial corporations—Q: Human health services and social work activities; NFCNPL_INF stands for aggregate NPLs—non-financial corporations—J: Information and communication; NFCNPL_MAN stands for aggregate NPLs—non-financial corporations—C: Manufacturing; NFCNPL_MIN represents the aggregate NPLs—non-financial corporations—B: Mining and quarrying; NFCNPL_OTH represents the aggregate NPLs—non-financial corporations—S: Other services; NFCNPL_PAD stands for aggregate NPLs—non-financial corporations—O: Public administration and defense, compulsory social security; NFCNPL_REA stands for aggregate NPLs—non-financial corporations—L: Real estate activities; NFCNPL_PRF represents the aggregate NPLs—non-financial corporations—M: Professional, scientific, and technical activities; NFCNPL_WRT stands for aggregate NPLs—non-financial corporations—G: Wholesale and retail trade; NFCNPL_TRA denotes the aggregate NPLs—non-financial corporations—H: Transport and storage; NFCNPL_WAT represents the aggregate NPLs—non-financial corporations—E: Water supply; NFCNPL_ACC denotes the aggregate NPLs—non-financial corporations—I: Accommodation and food service activities; NFCNPL_ADM stands for aggregate NPLs—non-financial corporations—N: Administrative and support service activities; UNEMP represents the % of unemployment; CPI denotes the quarterly consumer price index; R_GDP_Q2Q represents the quarterly percentage growth rate of real GDP; ROA stands for return on assets: profit or loss for the year/total assets; CAP represents the bank capital and reserves to total assets; LOAN_DISBRS stands for loan disbursements to customers; GOVT_RESP_STR represents the government response stringency index; COVID19_VACCINATED denotes the COVID-19 vaccinated population; finally, CULTURE_PCA stands for the national cultural identity variable.

Notes

[1] The United Kingdom is included in our selected country dataset, even though it exited the EU in January 2020.

[2] The missing data belong to the following countries/periods: Country group 1: Bulgaria, Croatia, Cyprus, Latvia, Slovakia/Period: 2015Q1–2018Q3, Country group 2: Italy/Period: 2015Q–2016Q3, Country group 3: Greece/Period: 2015Q1–2020Q3.

[3] Levin–Lin–Chu, Im–Pesaran–Shin, ADF–Fisher Chi-square, and PP–Fisher Chi-square tests were employed to account for data stationarity. Unit root tables for level, first, and second differences are available upon request.

[4] Second differences only applied on the variables: COVER_RATIO, DERIVATIVES, TIER1_CAP, and CAP.

[5] All unit root test results are available upon request.

[6] Durbin–Watson statistic results are depicted in respective tables of Appendix A.

[7] For instance, the statistics of COVID-19 deaths (COVID19_DEATHS) as well as of the vaccinations against COVID-19 (COVID19_VACCINATED), respectively, are only available in the post-COVID-19 period and not in the pre-COVID-19 period.

[8] Binary variable with values 1/0, where 1 denotes the existence of COVID-19 and 0 the non-existence of COVID-19.

[9] The descriptive statistics related to the secondary dependent variables and the control variables employed in this study, as well as the correlation matrix, are not depicted due to space limitations, but are available upon request.

[10] Tables depicting the regression results related with the NPL sector for the pre-pandemic period, as well as alternative econometric results generated for all the subsamples of the current research, are not included due to space limitations. All regression models are available upon request.

[11] Table 4 serves as both a supplement and a robustness check for the primary results pertaining to the entire sample period. All other robustness models are available upon request.

[12] Detailed robustness check results related to the exclusion of the United Kingdom are available upon request.

[13] Detailed results of the NPL ratio dependent variable collected from the EBA database are available upon request.

[14] Detailed results of robustness checks related to the alternative econometric methods used are available upon request.

References

Ahmed, Shakeel, M. Ejaz Majeed, Eleftherios Thalassinos, and Yannis Thalassinos. 2021. The Impact of Bank Specific and Macro-Economic Factors on Non-Performing Loans in the Banking Sector: Evidence from an Emerging Economy. *Journal of Risk and Financial Management* 14: 217. [CrossRef]

Alessi, Lucia, Brunella Bruno, Elena Carletti, Katja Neugebauer, and Isabella Wolfskeil. 2022. Cover your assets: Non-performing loans and coverage ratios in Europe. *Economic Policy* 36: 685–733. [CrossRef]

Alnabulsi, Khalil, Emira Kozarević, and Abdelaziz Hakimi. 2023a. Non-performing loans and net interest margin in the MENA region: Linear and non-linear analyses. *International Journal of Financial Studies* 11: 64. [CrossRef]

Alnabulsi, Khalil, Emira Kozarević, and Abdelaziz Hakimi. 2023b. Non-performing loans as a driver of banking distress: A systematic literature review. *Commodities* 2: 111–30. [CrossRef]

Apergis, Nicholas. 2022. Convergence in non-performing loans across EU banks: The role of COVID-19. *Cogent Economics & Finance* 10: 2024952. [CrossRef]

Arellano, Manuel, and Stephen Bond. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58: 277–97. [CrossRef]

Ari, Anil, Sophia Chen, and Lev Ratnovski. 2020. COVID-19 and Non-Performing Loans: Lessons from past Crises. *SSRN Electronic Journal*. [CrossRef]

Ari, Anil, Sophia Chen, and Lev Ratnovski. 2021. The dynamics of non-performing loans during banking crises: A new database with post-COVID-19 implications. *Journal of Banking and Finance* 133: 106140. [CrossRef]

Ashraf, Badar Nadeem, Changjun Zheng, and Sidra Arshad. 2016. Effects of national culture on bank risk-taking behavior. *Research in International Business and Finance* 37: 309–26. [CrossRef]

Banks, James, Heidi Karjalainen, and Carol Propper. 2020. Recessions and Health: The Long-Term Health Consequences of Responses to the Coronavirus. *Fiscal Studies* 41: 337–44. [CrossRef]

Bassani, Giovanni. 2021. Of Viruses, Economic Crises and Banks: The European Banking Union and the Response to COVID-19. *European Business Law Review* 32: 437–72. [CrossRef]

Bernanke, Ben S. 2009. *The Crisis and the Policy Response: A Speech at the Stamp Lecture*. London: London School of Economics, January 13. Speech 442, Board of Governors of the Federal Reserve System (U.S.).

Bettinger, Eric P. 2010. Instrumental Variables. In *International Encyclopedia of Education*, 3rd ed. Edited by P. Peterson, E. Baker and B. McGaw. Amsterdam: Elsevier, pp. 223–28. [CrossRef]

Bitar, Mohammad, and Amine Tarazi. 2022. Individualism, Formal Institutional Environment and Bank Capital Decisions. *Journal of Corporate Finance* 76: 102244. [CrossRef]

Boubakri, Narjess, Ali Mirzaei, and Anis Samet. 2017. National culture and bank performance: Evidence from the recent financial crisis. *Journal of Financial Stability* 29: 36–56. [CrossRef]

Boubakri, Narjess, Zheng Cao, Sadok El Ghoul, Omrane Guedhami, and Xinjie Li. 2023. National culture and bank liquidity creation. *Journal of Financial Stability* 64: 101086. [CrossRef]
Brunnermeier, Markus, and Arvind Krishnamurthy. 2020. The macroeconomics of corporate debt. *Review of Corporate Finance Studies* 9: 656–65. [CrossRef]
Ceylan, Rahmiye Figen, Burhan Ozkan, and Esra Mulazimogullari. 2020. Historical evidence for economic effects of COVID-19. *European Journal of Health Economics* 21: 817–623. [CrossRef]
Cicchiello, Antonella Francesca, Mariacristina Cotugno, Silvia Monferrà, and Stefano Perdichizzi. 2022. Credit spreads in the European green bond market: A daily analysis of the COVID-19 pandemic impact. *Journal of International Financial Management & Accounting* 33: 383–411. [CrossRef]
Colak, Gonul, and Oğuzhan Öztekin. 2021. The impact of COVID-19 pandemic on bank lending around the world. *Journal of Banking and Finance* 133: 106207. [CrossRef]
Couppey-Soubeyran, Jézabel, Erica Perego, and Fabien Tripier. 2020. 'European banks and the COVID-19 crash test'. *Europe Econpol* 4.
Cowling, Marc, Nick Wilson, Paul Nightingale, and Matej Kacer. 2022. Predicting future default on the COVID-19 bounce back loan scheme: The £46.5 billion question. *International Small Business Journal* 40: 650–66. [CrossRef]
Demir, Ender, and Gamze Ozturk Danisman. 2021. Banking sector reactions to COVID-19: The role of bank-specific factors and government policy responses. *Research in International Business and Finance* 58: 101508. [CrossRef]
Di Tommaso, Caterina, and Vincenzo Pacelli. 2022. Does nonperforming loan securitization affect credit default swap spreads? Evidence from European banks. *Journal of International Financial Management and Accounting* 33: 285–306. [CrossRef]
Duan, Yuejiao, Sadok El Ghoul, Omrane Guedhami, Haifeng Li, and Xinjie Li. 2021. Bank systemic risk around COVID-19: A cross-country analysis. *Journal of Banking and Finance* 133: 106299. [CrossRef] [PubMed]
Dunbar, Kwamie. 2022. Impact of the COVID-19 event on U.S. banks' financial soundness. *Research in International Business and Finance* 59: 101520. [CrossRef]
Durand, Pierre, and Gaëtan Le Quang. 2022. Banks to basics! Why banking regulation should focus on equity. *European Journal of Operational Research* 301: 349–72. [CrossRef]
EBA. 2019. EBA REPORT ON NPLs, www.eba.europa.eu. Available online: https://www.eba.europa.eu/sites/default/documents/files/document_library/Risk%20Analysis%20and%20Data/Risk%20Assessment%20Reports/2019/Final%20EBA%20Report%20on%20NPLs-for%20publication_final.pdf (accessed on 6 October 2023).
Foglia, Matteo, Abdelhamid Addi, and Eliana Angelini. 2022. The Eurozone banking sector in the time of COVID-19: Measuring volatility connectedness. *Global Finance Journal* 51: 100677. [CrossRef]
Gaganis, Chrysovalantis, Iftekhar Hasan, and Fotios Pasiouras. 2020. National culture and housing credit. *Journal of Empirical Finance* 56: 19–41. [CrossRef]
Giannetti, Mariassunta, and Yishay Yafeh. 2012. Do cultural differences between contracting parties matter? Evidence from syndicated bank loans. *Management Science* 58: 365–83. [CrossRef]
Hansen, Lars Peter. 1982. Large sample properties of generalized method of moments estimators. *Econometrica* 50: 1029–54. [CrossRef]
Ho, Kung-Cheng, Hsiu-Yun Huang, Zheng Pan, and Yifan Gu. 2023. Modern pandemic crises and default risk: Worldwide evidence. *Journal of International Financial Management & Accounting* 34: 211–42. [CrossRef]
Hoang, Thi-Hong-Van, Elysé A. Segbotangni, and Amine Lahiani. 2021. ESG Performance and COVID-19 Pandemic: An Empirical Analysis of European Listed Firms. *SSRN Electronic Journal*. [CrossRef]
Hofstede, Geert. 2001. *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations*. Newcastle upon Tyne: Sage.
Jameaba, Muyanja-Ssenyonga. 2020. Why the Italian Banking System that "Cruised Over" the Global Financial Crisis, Found Itself Roiled by the Sovereign Debt Crisis: Reviewing and Highlighting the Key Issues. *SSRN Electronic Journal*. [CrossRef]
Kindleberger, Charles P., and Robert Z. Aliber. 2011. *Manias, Panics, and Crashes: A History of Financial Crises*, 6th ed. London: Palgrave Macmillan.
Kostis, Pantelis C., Kyriaki I. Kafka, and Panagiotis E. Petrakis. 2018. Cultural change and innovation performance. *Journal of Business Research* 88: 306–13. [CrossRef]
Kozak, Sylwester. 2021. The Impact of COVID-19 on Bank Equity and Performance: The Case of Central Eastern South European Countries. *Sustainability* 13: 11036. [CrossRef]
Kryzanowski, Lawrence, Jinjing Liu, and Jie Zhang. 2022. Effect of COVID-19 on non-performing loans in China. *Finance Research Letters* 52: 103372. [CrossRef] [PubMed]
Laeven, Luc, and Fabian Valencia. 2021. Systemic Banking Crises: A New Database. *SSRN Electronic Journal*. [CrossRef]
Laeven, Luc, and Fabian Valencia. 2018. Systemic Banking Crises Revisited. *IMF Working Papers* 18. [CrossRef]
Laeven, Luc, and Fabian Valencia. 2020. Systemic Banking Crises Database II. *IMF Economic Review* 68: 307–61. [CrossRef]
Loang, Ooi Kok, Zamri Ahmad, and R. V. Naveenan. 2023. Non-performing loans, macroeconomic and bank-specific variables in Southeast Asia during COVID-19 pandemic. *The Singapore Economic Review* 68: 941–61. [CrossRef]
Makri, Vasiliki, Athanasios Tsagkanos, and Athanasios Bellas. 2014. Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus* 61: 193–206. [CrossRef]
Mateev, Miroslav, Ahmad Sahyouni, and Turki Al Masaeid. 2022. Bank performance before and during the COVID-19 crisis: Does efficiency play a role? *Review of Managerial Science* 18: 29–82. [CrossRef]

Mayordomo, Sergio, Maria Rodriguez-Moreno, and Juan Ignacio Peña. 2014. Derivatives holdings and systemic risk in the U.S. banking sector. *Journal of Banking and Finance* 45: 84–104. [CrossRef]
Minsky, Hyman P. 1992. The Financial Instability Hypothesis. *SSRN Electronic Journal*. [CrossRef]
Naili, Maryem, and Younès Lahrichi. 2022. Banks' credit risk, systematic determinants and specific factors: Recent evidence from emerging markets. *Heliyon* 8: e08960. [CrossRef] [PubMed]
Ozili, Peterson K. 2019. Non-performing loans and financial development: New evidence. *Journal of Risk Finance* 20: 59–81. [CrossRef]
Ozili, Peterson K., and Erick Outa. 2017. Bank loan loss provisions research: A review. *Borsa Istanbul Review* 17: 144–63. [CrossRef]
Dursun-de Neef, H. Özlem, and Alexander Schandlbauer. 2021. COVID-19 and lending responses of European banks. *Journal of Banking and Finance* 133: 106236. [CrossRef] [PubMed]
Park, Cyn-Young, and Kwanho Shin. 2021. COVID-19, nonperforming loans, and cross-border bank lending. *Journal of Banking and Finance* 133: 106233. [CrossRef]
Petrakis, Panagiotis E., Pantelis C. Kostis, and Dionysis G. Valsamis. 2015. Innovation and competitiveness: Culture as a long-term strategic instrument during the European Great Recession. *Journal of Business Research* 68: 1436–38. [CrossRef]
Petrakis, Panagiotis, and Pantelis Kostis. 2013. Economic growth and cultural change. *The Journal of Socio-Economics* 47: 147–57. [CrossRef]
Phillips, Peter C. B., and Donggyu Sul. 2007. Transition modeling and econometric convergence tests. *Econometrica* 75: 1771–855. [CrossRef]
Rinaldi, Laura, and Alicia Sanchis-Arellano. 2021. Household Debt Sustainability: What Explains Household Non-Performing Loans? An Empirical Analysis. *SSRN Electronic Journal*. [CrossRef]
Rizwan, Muhammad Suhail, Ghufran Ahmad, and Dawood Ashraf. 2020. Systemic risk: The impact of COVID-19. *Finance Research Letters* 36: 101682. [CrossRef] [PubMed]
Roodman, David. 2009. How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal* 9: 86–136. [CrossRef]
Salazar, Yadira, Paloma Merello, and Ana Zorio-Grima. 2023. IFRS 9, Banking Risk and COVID-19: Evidence from Europe. *Finance Research Letters* 56: 104130. [CrossRef]
Schwartz, Shalom H. 1994. Beyond individualism/collectivism: New cultural dimensions of values. In *Individualism and Collectivism: Theory, Method, and Applications*. Edited by U. Kim, H. C. Triandis, C. Kagitcibasi, S.-C. Choi and G. Yoon. Thousand Oaks: Sage Publications, pp. 85–119.
Sharif, Arshian, Chaker Aloui, and Larisa Yarovaya. 2020. COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. *International Review of Financial Analysis* 70: 101496. [CrossRef] [PubMed]
Shehzad, Khurram, Liu Xiaoxing, and Hayfa Kazouz. 2020. COVID-19's disasters are perilous than Global Financial Crisis: A rumor or fact? *Finance Research Letters* 36: 101669. [CrossRef] [PubMed]
Wellalage, Nirosha Hewa, Vijay Kumar, Arshad Iqbal Hunjra, and Mohammad Al-Faryan. 2022. Environmental performance and firm financing during COVID-19 outbreaks: Evidence from SMEs. *Finance Research Letters* 47: 102568. [CrossRef]
Xie, Xin, Nabeel Mirza, Muhammad Umar, and Xiang Ji. 2024. COVID-19 and market discipline: Evidence from the banking sector in emerging markets. *International Review of Economics & Finance* 89: 612–21. [CrossRef]
Yang, Jianlei, and Chunpeng Yang. 2021. Economic policy uncertainty, COVID-19 lockdown, and firm-level volatility: Evidence from China. *Pacific Basin Finance Journal* 68: 101597. [CrossRef]
Yi, Xingjian, Sheng Liu, and Zhouheng Wu. 2022. What drives credit expansion worldwide?—An empirical investigation with long-term cross-country panel data. *International Review of Economics & Finance* 80: 225–42. [CrossRef]
Zheng, Chen, and Junru Zhang. 2021. The impact of COVID-19 on the efficiency of microfinance institutions. *International Review of Economics & Finance* 71: 407–23. [CrossRef]
Žunić, Amila, Kemal Kozarić, and Emina Žunić Dželihodžić. 2021. Non-Performing Loan Determinants and Impact of COVID-19: Case of Bosnia and Herzegovina. *Journal of Central Banking Theory and Practice* 10: 5–22. [CrossRef]