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**Microeconomic and Macroeconomic
Determinants of Non-performing
Loans: The Case of Philippine
Commercial and Savings Banks**

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Abstract

This paper examines the microeconomic and macroeconomic determinants of non-performing loans (NPLs) across six loan categories in the Philippines during periods of robust economic growth. Using instrumented dynamic panel models, the results indicate that NPLs tend to persist over time. In addition, bank-specific characteristics and macroeconomic conditions are likely to affect agricultural and SME NPLs (mandatory loans), while only macroeconomic factors seem to have an impact on corporate and consumption NPLs (regular loans). In particular, cost-inefficient banks tend to have higher agricultural and SME NPLs indicating that the loan quality of these two mandatory credits is associated with operational inefficiency. Additionally, rising unemployment rates seem to increase agricultural NPLs. Furthermore, highly capitalized banks tend to have more agricultural NPLs implying higher credit risk for agricultural loans. Meanwhile, higher SME NPLs are associated with tighter credit standards. In addition, rising GDP growth rates are likely to contribute to higher SME NPLs and the impact tends to last for a long period. These findings suggest a deterioration in SME loan quality and a possible credit risk build-up in SME lending segment of banks along with Philippine economic progress. Similarly, higher GDP growth rates tend to increase corporate and consumption NPLs (regular loans). However, microfinance and housing NPLs seem to be not sensitive to macroeconomic developments.

JEL classification: C23, E51, G21

Keywords: Non-performing loans, determinants of bad loans, Philippine banks

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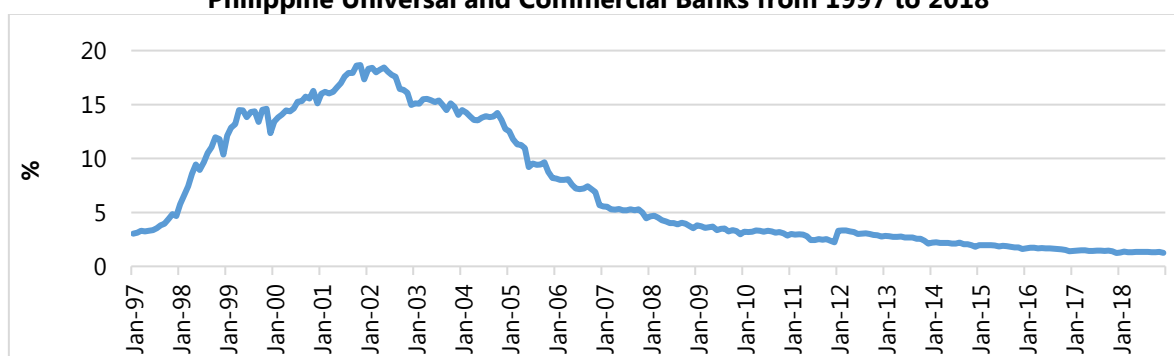
Reynalyn G. Punzalan and Roberto Leon-Gonzalez¹

1. Introduction

The ratio of non-performing loans to total gross loans (NPLs) is one of the core financial soundness indicators used by bank supervisors.² It indicates the quality of bank assets, particularly loans, wherein an increasing ratio signals a deterioration in loan quality (International Monetary Fund [IMF], 2019, p.88). In the literature, NPLs have been linked with facilitating and prolonging financial crises (Ari et al., 2019). In addition, many empirical studies provide support on the cross-linkages between NPLs and the growth of aggregate economy. On one hand, macroeconomic conditions affect NPLs by influencing borrowers' debt-servicing capacities. On the other hand, NPLs feed back to the real economy by constraining bank credits to economic agents thus affecting outputs. Hence, understanding the nature and characteristics of NPLs are crucial for policy development.

In the Philippines, NPLs have been continuously decreasing since the post-Asian financial crisis era (Figure 1). NPL resolution strategies, regulatory reforms, and enhancement in credit risk management policies of banks could have contributed to the decline in NPLs (Baudino & Yun, 2017). In addition, favorable economic performance of Philippine economy between 2000 and 2018 could have enhanced the repayment capacities of borrowers. Although the declining trends in NPLs pose no imminent threat to the stability of Philippine banking system, identifying the factors affecting NPLs are important aspects of macroprudential surveillance, policy development, and NPL resolution strategies should economic shocks occur.

Figure 1. Percentage of Non-performing Loans to Total Loans of Philippine Universal and Commercial Banks from 1997 to 2018



Note: This figure is drawn from the publicly available NPL data from the Bangko Sentral ng Pilipinas which do not include the NPLs of thrift banks. This series reflect the revised definition of NPLs starting 2012 without adjusting the previous years' data hence, a sudden spike in NPLs ratio is

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² Financial Soundness Indicators (FSIs) are IMF-recommended indicators on the financial health of financial institutions (IMF, 2019, p.1).

observed in January 2012. However, the dataset in this paper utilizes the same definition of NPLs throughout the sample period and includes thrift banks.

Empirical works on NPLs in the Philippines remain limited particularly studies with bank-level data. For instance, Lee and Rosenkranz (2019) analyze the determinants of NPLs using 165 banks in Asia including the Philippines. They find that macroeconomic factors have more quantitative impact on NPLs than bank-specific characteristics. Meanwhile, a granular analysis of NPLs is conducted by Louzis et al. (2012) by examining NPLs of mortgages, consumer, and business loans of nine Greek banks from 2003Q1 to 2009Q3 (27 quarters). They find that declining GDP growth and rising unemployment rates strongly affect business NPLs but slightly influence mortgages NPLs. Our approach is similar to the strategy of Louzis et al. (2012), since we also investigate the macroeconomic and bank-specific determinants of NPLs using dynamic panel models. However, our study differs from their research in several ways and contributes to the literature in the following manner. First, we employ a longer panel dataset with 130 banks and 40 quarters from 2009Q1 to 2018Q4. Hence, our estimates are more efficient than those of previous studies. In addition, our panel dataset allows us to jointly estimate several bank-specific characteristics and macroeconomic variables unlike Louzis et al. (2012) who estimate only one bank-specific variable at a time with macroeconomic variables. Second, we provide a more granular analysis of NPLs using regular loans (corporate, consumption, and housing loans) and specialized credits (agricultural, small- and medium-enterprises, and microfinance loans) in the Philippines which is not commonly done in the literature. Third, we employ alternative measures of lending policies, namely, the ratio of real and other properties acquired to total assets (ROPA/TA) as proxy for bank's lending policies on collateral requirements and the diffusion index for credit standards as proxy for the general credit standards in the banking industry. Finally, to the best of our knowledge, this study is the first comprehensive analysis on microeconomic and macroeconomic determinants of NPLs in the Philippines using dynamic panel models.

This paper proceeds as follows: Section 2 provides the literature on microeconomic and macroeconomic determinants of NPLs. Section 3 discusses the empirical strategy. Section 4 describes the data. Section 5 provides the results. Finally, Section 6 presents the conclusion and policy implications.

2. Literature review

The most common indicator of loan quality in the literature is the ratio of non-performing loans to total loans, which is broadly defined as the ratio of loans with missed payment on principal or interest for the past 90 days over total loans. Several empirical evidence suggest that macroeconomic fundamentals and banking characteristics seem to influence NPLs. They argue that macroeconomic variables are external factors that affect borrowers' repayment capacity. Meanwhile, banking characteristics are internal factors that indicate the risk-taking activities of banks. However, many of these empirical studies employ country-level and aggregate banking data. Nevertheless, there is growing strand of NPL literature that utilizes bank-level data and some of them are presented below.

2.1 Bank-specific factors

Berger and Deyoung (1997) and Louzis et al. (2012) examine the bank-specific factors that may affect NPLs and provide the following hypotheses:

First, “moral hazard” hypothesis suggests that low-capitalized banks (as measure by equity to assets ratio) tend to have higher NPLs. Berger and DeYoung (1997) argue that since these banks are already high risk, they have the incentive to grant riskier loans in exchange for higher profits. Several researchers also provide support to this hypothesis (Salas & Saurina, 2002; Louzis et al., 2012; Klein, 2013; Lee & Rosenkranz, 2019).

Second, “bad management” hypothesis provides that cost-inefficient banks are likely to have more NPLs. Berger and DeYoung (1997) argue that low cost-efficiency (as a function of operating expenses) signals poor management practices. Inadequate loan underwriting, monitoring, and control processes may lead to poor loan collection practices, thereby contributing to NPL build-up. Using another measure of efficiency (higher non-interest expenses to assets ratio), Espinoza and Prasad (2010) show that inefficient banks in Arab countries also tend to have higher NPLs. Similar results are obtained by Williams (2004) for European banks, Podpiera and Weil (2008) for Czech banks, and Louzis et al. (2012) for Greek banks.

On the contrary, the “skimping” hypothesis suggests that cost-efficient banks may have more NPLs. Berger and DeYoung (1997) explain that bank managers might intentionally cut their expenses on credit evaluation and monitoring to improve current income at the expense of rising NPLs in the future. Alternatively, other studies employ profitability index (higher net-income to equity) to test the “good management” hypothesis (Klein, 2013; Lee & Rosenkranz, 2019). They argue that positive profits indicate good management and properly managed banks will have better loan quality and lower NPLs.

Third, “diversification” hypothesis says that banks with diversified sources of income (non-interest income from non-lending operations) tend to have fewer NPLs. Although Louzis et al. (2012) are not able to confirm this hypothesis for Greek banks.

Lastly, “excess lending” hypothesis suggests that rapid credit expansion (loan growth or higher loans to assets ratio) may lead to rising NPLs. Aggressive loan growth strategies can motivate bank officers to ease their credit standards to achieve their targets and widen their clientele base. Several researchers also confirm this hypothesis (Clair, 1992; Salas & Saurina, 2002; Klein, 2013; Lee & Rosenkranz, 2019).

The lending policies of banks may also influence NPLs. However, it is difficult to measure for empirical validation. To test this hypothesis, Salas and Saurina (2002) utilize the change in net interest margin as proxy for credit standards. Meanwhile, Berger and Udell (1990) examine the presence of collaterals in loan contracts as indicator of lending policies and find that pledges of collaterals on commercial loans is positively associated with riskier borrowers and higher NPLs. Collaterals may lead to relaxation of credit evaluation, wherein loan officers rely more on collateral values instead on borrowers’ capacity to repay the loans hence increasing NPLs. In addition, collateral values may have an impact on NPLs. Using Indian stock

price index as proxy for collateral value, Rajan and Dhal (2003) find a positive association between stock prices and NPLs. They argue that high collateral values may induce soft lending that may result to riskier loans and more NPLs.

2.2 Macroeconomic factors

Macroeconomic factors can also affect the evolution of NPLs during business cycles. Several studies provide evidence that NPLs follow a countercyclical path (Salas & Saurina [2002] for Spanish banks; Rajan & Dhal [2003] for Indian banks; Quagliariello [2007] for Italian banks; Espinoza & Prasad [2010] for Arabian banks; Louzis et al. [2012] for Greek banks; Klein [2013] for European banks; Lee & Rosenkranz [2019] for Asian banks). As GDP grows, borrowers earn more income to service their debt obligations translating to lower NPLs. Likewise, as the economy contracts, unemployment increases and some borrowers might lose their jobs and have difficulty in repaying their loans resulting to more NPLs. In addition, GDP growth may affect the demand for loans. As the economy grows, businesses and individuals may increase their borrowing to finance higher production and consumption.

Similarly, macroeconomic environmental factors such as inflation, lending rates, and exchange rates may influence NPLs. For instance, Klein (2013) argues that rising inflation lowers the real value of debt obligations. At the same time, higher inflation decreases the real income of borrowers thus lowering borrowers' debt-servicing capacities. In a study of Asian banks, Lee and Rosenkranz (2019) find that rising inflation has a stronger impact on real income deterioration which may lead to more NPLs. Moreover, Louzis et al. (2012) find that increasing lending rates may contribute to higher NPLs, since borrowers with floating interest rates have to pay more interest. Furthermore, Lee & Rosenkranz (2019) argue that exchange rate depreciation may adversely affect borrowers with unhedged foreign currency-denominated loans and put an upward pressure on NPLs.

3. Empirical Strategy

In this section, we discuss the estimation procedures and some specification test results.

We implement two-stage least squares on dynamic panel models with fixed effects to analyze the microeconomic and macroeconomic determinants of non-performing loans in the Philippines. Our model is specified as:

$$NPL_{i,t}^j = \alpha NPL_{i,t-1}^j + B'_{i,t}\beta + \rho d_{i|k,t} + M'_t\delta + I'_t\lambda + \theta t_t + v_i + \varepsilon_{i,t}$$

where $NPL_{i,t}^j$ pertains to the ratio of non-performing loans to total loans in loan category j of bank i at quarter t , $B_{i,t}$ are vectors of bank-specific variables that are composed of asset-side variables $B_{Ai,t}$, liability-/equity-side variables $B_{Bi,t}$, and income-related variables $B_{Ci,t}$, $d_{i|k,t}$ is a dummy variable equals one when bank i acquired or merged with bank k throughout the post-merger or post-acquisition period, M_t is a vector of macroeconomic variables, and I_t are vectors of industry-wide lending standards I_{1t} and loan demand I_{2t} . Meanwhile, t_t pertains to the trend effect, v_i refers to bank fixed effects or unobserved heterogeneity of bank i that may be correlated with the regressors, and $\varepsilon_{i,t}$ denotes the idiosyncratic error term that is assumed to be uncorrelated with all explanatory variables and bank fixed effects.

For dynamic panel model with short period, the inclusion of lagged dependent variable makes the estimate $\hat{\alpha}$ inconsistent, since $NPL_{i,t-1}$ is correlated with the mean error $\bar{\varepsilon}_i$ through $\hat{\varepsilon}_{i,t-1}$ as raised by Nickell (1981). Nonetheless, he points out that the demeaned lagged dependent variable ($NPL_{i,t-1} - \bar{NPL}_{i,-1}$) will not be correlated with the demeaned error ($\hat{\varepsilon}_{i,t} - \bar{\varepsilon}_i$) whenever time $T \rightarrow \infty$ since the mean error $\bar{\varepsilon}_i \rightarrow 0$. Thus, the bias in α disappears in dynamic panel model with fixed effects when T is large (Cameron & Trivedi, 2005, p.764).

Additionally, we specify two dynamic panel models for each NPL category with either asset-side variables or liability-/equity-side variables in the model. Since total assets is always equal to total liabilities and equity in a balance sheet, alternately specifying asset ratios and liability/equity ratios in the regressions will allow us to distinguish the impact of banks' uses of funds (asset-side of balance sheet) from their sources of funds (liability-/equity-side of balance sheet) on NPLs. Specifically, we estimate a model with asset-side variables given by:

$$NPL_{i,t}^j = \alpha NPL_{i,t-1}^j + \beta_1 ROPA/TA_{i,t} + \beta_2 TL^j/TA_{i,t} + \beta_3 Loangrowth_{i,t} + \beta_4 TAGrowth_{i,t} + B'_{Ci,t}\gamma + \rho d_{i|k,t} + M'_t\delta + I'_t\lambda + \theta_t + v_i + \varepsilon_{i,t} \quad (1)$$

and a model with liability-/equity-side variables described as:

$$NPL_{i,t}^j = \alpha NPL_{i,t-1}^j + \beta_1 Equity/TA_{i,t} + \beta_2 Deposit/TA_{i,t} + \beta_3 Depositgrowth_{i,t} + \beta_4 Equitygrowth_{i,t} + B'_{Ci,t}\gamma + \rho d_{i|k,t} + M'_t\delta + I'_t\lambda + \theta_t + v_i + \varepsilon_{i,t} \quad (2)$$

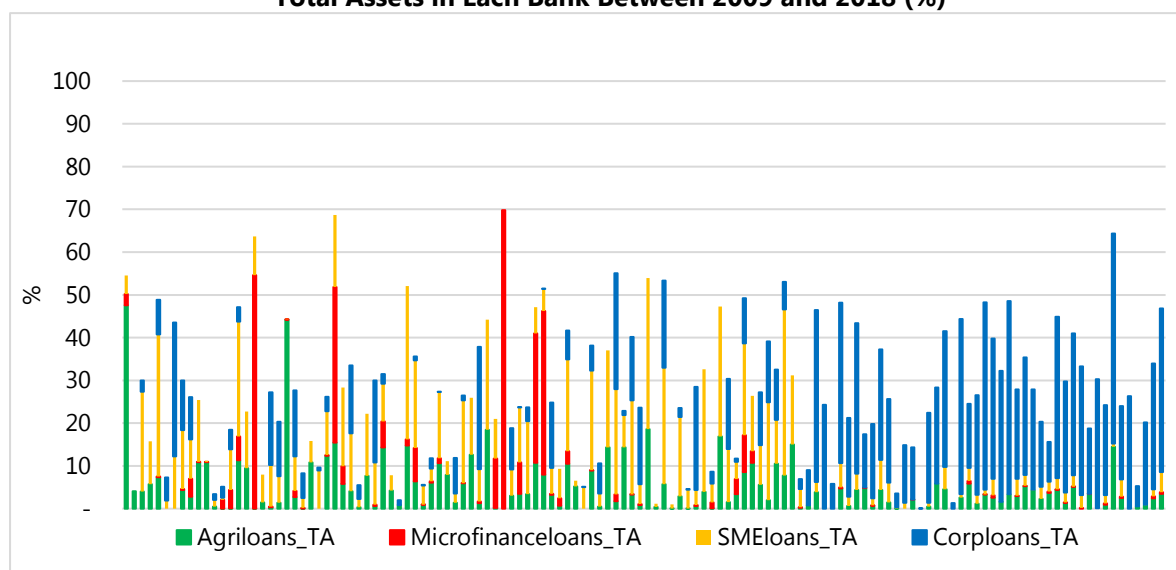
The asset-side variables $B_{Ai,t}$ in Equation (1) are the following: ROPA/TA is the ratio of real and other properties acquired to total assets as proxy for bank's lending policies on collateral requirements. ROPA represents the amount of secured loans that defaulted where the collaterals are already foreclosed by banks. After the bank acquires ownership on collateral, the secured non-performing (defaulted) loan will be reclassified into ROPA at the carrying amount of the loan. Hence, from being a loan, it becomes an "acquired asset" since the bank already owns the property. It should be noted that while NPL_t can affect $ROPA_{t+1}$, NPL_t cannot influence $ROPA_t$. A bank that relies more on collateral values and not on borrower's repayment capacity will have an accumulation of ROPA in its balance sheet. In addition, Berger and Udell (1990) provide evidence that collaterals are associated with riskier borrowers. Hence, ROPA may represent bank's previous policy on collateral requirement when granting loans to probably risky borrowers.

TL^j/TA is the ratio of total loans in loan category j to total assets and captures bank's concentration in a certain lending activity. For example, agricultural NPLs have $TL^j/TA_{i,t}$ = agricultural loans to total assets ratio in the regression.³ We include this variable because Philippine banks have different loan concentration, although they provide credits to both businesses and individuals (Figure 2). Loan growth is the growth rate of aggregate loan

³ $TL^j/TA_{i,t}$ for other loan categories are the ratios of: total SME loans to total assets for SME NPLs, total microfinance loans to total assets for microfinance NPLs, total corporate loans to total assets for corporate NPLs, and total individual loans to total assets for both consumption and housing NPLs.

portfolios and TA growth is the total assets growth. These two variables control for the growth effects as Philippine banks continuously grow from 2009 to 2018.

Figure 2. Average Ratio of Total Loans per Category to Total Assets in Each Bank Between 2009 and 2018 (%)



Note: Each column corresponds to a bank and the colors represent its loan concentration across categories. This figure is drawn from the quarterly regulatory reports from the Bangko Sentral ng Pilipinas.

On the other hand, the liability-/equity-side variables $B_{Bi,t}$ in Equation (2) are equity to total assets ratio (Equity/TA), deposits to total assets ratio (Deposit/TA), deposit growth, and equity growth. In earlier literature, Equity/TA is utilized to test moral hazard hypothesis, wherein low-capitalized banks tend to have higher NPLs.⁴ However, with the risk-based capital adequacy framework implemented in July 2007, wherein banks with riskier assets are required to have higher capital, there might be simultaneous causality between NPLs and banks' equity. As NPLs increase, banks have to provide more loan loss allowances which may require additional equity to maintain the minimum capital ratio set by regulatory authority. Thus, we use the values of Equity/TA from the two previous quarters as instruments for the current Equity/TA to address reverse causality.

Meanwhile, the income-related variables $B_{Ci,t}$ are the results of banks' uses and sources of funds and cannot be identified as asset-side nor liability-/equity-side item of a balance sheet. Hence, they are included in Equations (1) and (2). These regressors are the net interest income to average assets ratio as a measure of bank profitability from lending operations, non-interest income to average assets ratio as a measure of bank profitability from non-lending activities and a proxy for diversification, and non-interest expense to average assets ratio as a measure of operating expenses and a proxy for operational inefficiency. Several studies (mentioned in Section 2) provide evidence that bank profitability, diversification, and operational efficiency have an impact on NPLs.

⁴ Studies that provide evidence in support of moral hazard hypothesis include Berger and DeYoung (1997), Salas and Saurina (2002), Louzis et al. (2012), Klein (2013), and Lee and Rosenkranz (2019).

The bank-specific variables $B'_{i,t}$ are covariance stationary based on Fisher type-Augmented Dickey Fuller panel unit root test (Choi, 2001). However, they may have endogeneity issues with the error term $\varepsilon_{i,t}$ and reverse causality with NPLs. Hence, we opt to instrument all bank-specific variables with their values from the previous two quarters.

Moreover, we introduce proxies for general lending standards in the banking industry and for loan demand using “diffusion index for credit standards” and “diffusion index for loan demand”, respectively. These industry-level variables are qualitative indicators of the change in credit standards and change in loan demand from the previous quarter, which we obtain from Senior Bank Loan Officers’ survey of Bankgo Sentral ng Pilipinas (BSP). On a quarterly basis, BSP conducts the survey among banks regarding changes in their policies on loan margin, size of credit lines, collateral requirements, covenants, maturity, and use of interest rate floors as well as on their perceived change in loan demand from the previous quarter (BSP, 2017a). Based on the results of the survey, diffusion index for credit standards is computed as the percentage of respondent banks that tighten their credit standards less the percentage of respondent banks that loosen their credit standards. It can take a value between -100% and 100%. A positive (negative) diffusion index for credit standards indicates that more banks have tightened (loosened) as opposed to those that have eased (tightened) their lending standards. Similarly, diffusion index for loan demand is the percentage difference between banks that reported an increase in loan demand and banks that reported a decrease in loan demand. A positive diffusion index for loan demand means that more banks reported an increase in loan demand compared to those that stated a decrease.

The survey provides separate diffusion index for enterprises and households, namely, diffusion index for credit standards on enterprises, diffusion index for credit standards on households, diffusion index for loan demand of enterprises, and diffusion index for loan demand of households.⁵ We use the four diffusion indices in our models and jointly estimate their impact on NPLs. However, diffusion index for credit standards may have spontaneous causality with NPLs as banks tend to tighten their lending standards when economic conditions worsen and NPLs increase. Hence, we instrument credit standards with its value from the previous quarter. In addition, the credit standards for households and credit standards for enterprise seem have strong collinearity (correlation coefficients = 0.82). Thus, we jointly test the credit standards for enterprises and households to determine the impact of lending policies on NPLs. On the other hand, we assume that diffusion index for loan demand is exogenous.

Furthermore, we include GDP growth, unemployment rates, lending rates, inflation rates, and foreign exchange rates as macroeconomic determinants of NPLs based on empirical findings of earlier studies.⁶ For GDP growth, we also include its four quarters lags to evaluate the dynamic and long-term impact of GDP on NPLs.⁷ The long-run estimate of GDP with k lags is computed as:

⁵ Enterprises pertain to private corporations and micro-, small-, and medium-enterprises. Meanwhile, households pertain to individuals who avail of housing and consumption loans (credit card, automobiles, and salary loans).

⁶ Such as studies by Louzis et al. (2012), Klein (2013), and Lee and Rosenkranz (2019).

⁷ We choose four quarter lags of GDP growth because it yields the lowest Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) compared with one, two, and three lags.

$$\delta_{GDP}^{LR} = \frac{1}{1 - \alpha} \left(\sum_{k=0}^4 \delta_{GDP,k} \right) \quad (3)$$

where α is the coefficient of lagged NPL.

We assume that macroeconomic variables are exogenous and reserve requirement ratios on deposits follow a quadratic form to account for multiplier effect. However, macroeconomic variables are not covariance stationary based on Augmented Dickey Fuller tests. Nevertheless, trend coefficient controls for the trend effect of macroeconomic conditions. In addition, bank lending rates and loan demand seem to have strong multicollinearity with other macroeconomic variables (correlation coefficients $> |0.60|$) which may lower the significance of estimates. Nonetheless, we choose to maintain bank lending rates and loan demand in the model as control variables.

Lastly, we evaluate if our models are properly specified. First, we specify a model with only macroeconomic M'_t and loan demand I'_{2t} to examine the predictive power of bank-specific variables using Equation (4):

$$NPL_{i,t}^j = \alpha NPL_{i,t-1}^j + M'_t \delta + I'_{2t} \lambda + \theta t_t + v_i + \varepsilon_{i,t} \quad (4)$$

The smaller information criteria (AIC and BIC) reported in Tables 2 and 3 compared to those in Table 4 support the inclusion of bank-level data as explanatory variables for NPL. Second, we prefer fixed effects estimator based on Hausman (1978) test. Third, we reject the null hypothesis that asset-side variables are exogenous as the p-values of Chi-squared statistic $< .05$ (Models 2 and 3 of Tables 2). Hence, we use instruments for all bank-specific variables as well as credit standards. However, we assume that the lagged dependent variable $NPL_{i,t-1}$ is exogenous. Fourth, the instruments (IVs) are valid based on relevance and over-identification tests. We fail to reject the null hypothesis that IVs are uncorrelated with error terms $\varepsilon_{i,t}$, since the p-values of Hansen's J statistic $> .05$ (Models 1 to 6 of Tables 2 and 3). Additionally, all IVs are relevant, since first stage F-statistic > 10 in the joint hypothesis testing of all IV coefficients are zeros (the rule of thumb for first stage F-statistic > 10 is adopted from Staiger and Stock, 1997).⁸ Fifth, we test the assumption of no serial correlation in $\varepsilon_{i,t}$ by regressing the predicted idiosyncratic error term $\hat{\varepsilon}_{i,t}$ on its lag $\hat{\varepsilon}_{i,t-1}$. The results (available upon request from the author) suggest that our specifications do not exhibit first-order autocorrelation at 5% significance level. Finally, we do not cluster the standard errors. As raised by Abadie et al. (2017), clustering is appropriate only when both residuals and regressors are correlated within clusters. Since our models seem to have very weak endogeneity and no first-order autocorrelation issues, we find it adequate to use heteroscedasticity-robust standard errors.

⁸ When the number of IVs is moderate or large, the critical value is a lot larger than Staiger–Stock rule of thumb of F-statistic > 10 (Stock & Yogo, 2002). Nonetheless, first stage F-statistics in our model are way above ten.

4. Data

We use an unbalanced panel dataset of 130 universal, commercial, and thrift banks (collectively referred as commercial and savings banks in this study) from 2009Q1 to 2018Q4.⁹ In case of merger or acquisition, the surviving bank provides a consolidated financial report. Bank-level data is extracted from proprietary reports submitted by banks to BSP, while macroeconomic variables are also obtained from the BSP as well as the Philippine Statistics Authority.

Dependent variables are the ratios of: (a) non-performing agricultural loans to total agricultural loans (agricultural NPLs), (b) non-performing microfinance loans to total microfinance loans (microfinance NPLs), (c) non-performing small- and medium-enterprises (SME) loans to total SME loans (SME NPLs), (d) non-performing corporate loans to total corporate loans (corporate NPLs), (e) non-performing consumption loans to total consumption loans (consumption NPLs), and (f) non-performing housing loans to total housing loans (housing NPLs). These loan classifications are lifted from regulatory reports; hence, they can be considered as reliable and consistent over the sample period.

While BSP provides several loan categories depending on the type of borrowers and purpose of loans, we select the six NPL categories due to the following reasons. First, agricultural and small- and medium-enterprise (SME) loans are mandatory credits in the Philippines. In particular, domestic banks are required to allocate portion of their loanable funds as follows: 25% on agriculture and agrarian reform credits (referred as agricultural loans), 8% on micro- and small-enterprises, and 2% medium-enterprises (reported separately as microfinance and SME loans, BSP, 2017b, p.50 & p.53). SME loans are loans to business entities with total assets below 100 million Philippine pesos (approximately two million USD). These SMEs provide the majority of employment in the Philippines (around 63% of employment in 2016) (Organization for Economic Cooperation and Development, 2018, p.374). Second, microfinance is among government policy tools for poverty alleviation and inclusive growth, hence their loans are governed by special regulations. Microfinance loans are loans to micro-enterprises with total assets below three million Philippine pesos (approximately USD 60,000) and loans to low-income households (BSP, 2017b). Third, corporate loans represent the majority of bank loans in the Philippines (BSP, 2019). Corporate loans are loans to enterprises that will not qualify as micro-, small-, or medium-enterprise loans. Fourth, consumption loans may play an important role in spurring Philippine economic growth, since private consumption contributes around 70% of GDP for the past 20 years. Consumption loans are loans to individuals for personal use such as credit card, automobiles, and salary loans. Lastly, housing loans are of special interest to regulatory authorities because of possible linkages between financial crisis and housing loan defaults. Housing loans are loans to individuals for residential purposes. Given the potential relevance of these loans to the Philippine economy, understanding the factors affecting their loan quality is important for banking supervision and policy development.

⁹ Our dataset includes 20 banks that were closed, 12 banks that were merged/acquired with another bank, and 17 banks that were newly opened between 2009 and 2018. In addition, the dataset excludes rural banks, which are primarily engaged in agricultural lending, due to unavailability of data.

Table 1 presents the descriptive statistics. NPLs of corporate loans (6.61%) are below the total NPLs across loan categories (9.94%), while NPLs of other loan categories are above the total NPLs. Specifically, microfinance has the highest NPLs at 31.20%. This statistic implies that microfinance has the lowest loan quality. In addition, this finding may provide some rational why only 67 out of 130 banks are engaged in microfinance lending and why microfinance has one of the highest borrowing rates. Meanwhile, the loan quality of mandatory credits, 15.63% agricultural NPLs and 13.21% SME NPLs, is comparable to that of consumption loans with 17.56% NPLs. On the other hand, housing loans have better loan quality at 11.92% NPLs, while corporate loans have the best loan quality at 6.61% NPLs. However, corporate NPLs are very volatile, with the highest skewness and excess kurtosis.

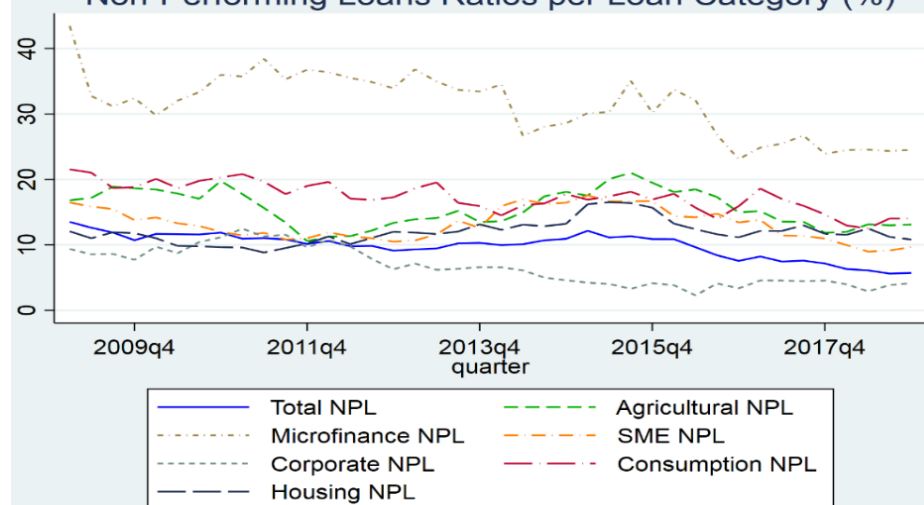
Table 1. Descriptive Statistics of Non-performing Loans Ratios (%) for each Loan Category

NPLs	Total loans	Specialized lending			Regular lending		
		Agri-cultural	Micro-finance	SME	Corporate	Consumption	Housing
Mean	9.94	15.63	31.20	13.21	6.61	17.56	11.92
St. deviation	14.59	25.01	34.75	20.09	16.97	27.13	19.81
Minimum	0	0	0	0	0	0	0
Maximum	100	100	100	100	100	100	100
Skewness	2.91	2.09	1.04	2.67	3.98	1.94	2.76
Kurtosis	12.93	6.64	2.59	10.46	19.21	5.76	10.83
# of obs	4,154	3,494	1,629	3,746	2,872	3,017	3,148
# of banks	130	117	67	118	99	105	104

Note: The observation period spans from 2009Q1 to 2018Q4. The data is obtained from the quarterly reports submitted to the Bangko Sentral ng Pilipinas.

As shown in Figure 3, total NPLs are generally down trending but specific NPLs follow different patterns. There could be significant variations in specific NPLs which may be attributed to the differential impacts of bank-specific characteristics and macroeconomic conditions across loan categories. Hence, we find it appropriate to conduct a granular analysis on the determinants of NPLs.

Figure 3. Non-performing Loans Ratios of Philippine Universal, Commercial, and Thrift Banks for Each Loan Category
Non-Performing Loans Ratios per Loan Category (%)



Note: Total NPLs refer to total non-performing loans to total loans ratios across loan categories. This figure is drawn using data from the Bangko Sentral ng Pilipinas.

5. Results

We estimate the parameters using two-stage least squares on dynamic panel models with fixed effects where we instrumented bank-specific variables with their two quarters lags and credit standards with their one quarter lag.¹⁰ Tables 2 and 3 present the estimation results for each NPL category.

5.1 Bank-specific determinants

Lagged NPLs positively and strongly affect current NPLs across loan categories (estimates around 0.8% in Tables 2 and 3). This finding suggests that previous NPLs appear to be the leading indicator of current NPLs and any shock to NPLs tend to persist over time.

Additionally, bank-specific characteristics tend to affect agricultural and SME NPLs but not corporate and consumption NPLs. In particular, cost-inefficient banks (higher non-interest expense to average assets ratios) tend to have more agricultural NPLs (estimates around 0.4% in Model 1 of Tables 2 and 3) and SME NPLs (estimates around 0.5% in Model 2 of Tables 2 and 3). These results indicate that the poor loan quality of mandatory credits (agricultural and SME loans) is associated with operational inefficiency consistent with “bad management” hypothesis. Berger and DeYoung (1997) provide that low cost-efficiency signals inadequate credit underwriting, monitoring, and control processes. Since we control for credit standards in our models, operational inefficiency possibly signals poor loan monitoring and collection practices which may contribute to higher agricultural and SME NPLs. On the other hand, NPLs of regular loans (corporate, consumption, and housing loans) are not associated with operational inefficiency.

Moreover, highly capitalized banks (higher equity to assets ratio) seem to have higher agricultural NPLs (estimates around 0.14% in Model 1 of Table 3). This finding implies that agricultural loans seem to have higher credit risk than other type of loans. This result might probably explain the continuing under-compliance of Philippines banks to 25% mandatory credit allocation.

Furthermore, SME NPLs are associated with tighter credit standards (estimates around 0.3% in Model 2 of Tables 2 and 3). The coefficients are still significant based on the joint-test of credit standards for enterprises and households. Lown et al. (2000) provide evidence that banks tend to tighten their credit standards preceding economic recessions and slower loan growth. In addition, the respondent banks to Senior Bank Loan Officers’ survey reported that they imposed stricter credit standards due to lower macroeconomic outlook and anticipated decrease in bank profits (BSP, 2011; BSP, 2017a). Since we control for GDP, loan growth, and bank income in our specifications, the positive sign of credit standards suggests that the tightening of credit standards probably indicate a deterioration in the quality of SME loans. Banks might have been imposing stricter credit terms to SME borrowers in consideration of their potentially lower repayment capacities that can eventually result to more SME NPLs.

¹⁰ We use the Stata commands of Schaffer (2005).

Table 2. Estimates for Each NPL Category Using a Model with Asset-side Variables

Model:	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Agricultural NPL	SME NPL	Microfinance NPL	Corporate NPL	Consumption NPL	Housing NPL
<i>Bank-specific variables</i>						
Lagged dependent variable	0.781*** (0.027)	0.763*** (0.071)	0.789*** (0.037)	0.729*** (0.057)	0.766*** (0.034)	0.774*** (0.039)
Total Loan per category/ Total Assets	-0.049 (0.036)	-0.027 (0.050)	0.053 (0.111)	-0.041 (0.033)	0.076* (0.040)	0.027 (0.029)
ROPA/Total Assets	0.078 (0.113)	0.267 (0.218)	-0.177 (0.134)	0.081 (0.177)	0.020 (0.149)	0.092 (0.088)
TA growth	-5.183* (2.942)	-1.254 (1.356)	0.464 (1.464)	-0.457 (0.664)	-1.017 (0.626)	-0.649 (1.680)
Loan growth	1.239 (1.846)	0.001 (0.007)	-0.073 (0.640)	0.072 (0.343)	-0.001 (0.001)	0.003 (0.834)
Net Interest Income/ Average Assets	0.120 (0.262)	0.258 (0.492)	-0.133 (0.172)	-0.266 (0.291)	-0.089 (0.306)	0.055 (0.460)
Non-Interest Income/Average Assets	-0.078 (0.258)	-0.284 (0.182)	-0.461** (0.185)	0.147 (0.255)	-0.231 (0.445)	-0.563 (0.370)
Non-Interest Expense/Average Assets	0.479*** (0.183)	0.544* (0.286)	0.378** (0.151)	-0.056 (0.379)	0.139 (0.261)	0.528 (0.444)
Credit standards for Households	0.209 (0.241)	-0.184 (0.191)	0.015 (0.325)	0.239 (0.187)	0.187 (0.193)	-0.055 (0.175)
Credit standards for Enterprises	-0.081 (0.197)	0.314** (0.158)	-0.152 (0.241)	-0.171 (0.140)	-0.087 (0.170)	0.148 (0.170)
Loan demand of Enterprises	0.043 (0.032)	-0.000 (0.032)	-0.036 (0.050)	0.011 (0.028)	0.017 (0.032)	-0.020 (0.026)
Loan demand of Households	0.014 (0.043)	0.019 (0.032)	0.061 (0.053)	-0.025 (0.035)	-0.069 (0.045)	-0.005 (0.035)
Dummy for first merger	0.062 (1.869)	-0.682 (0.794)	-1.166 (1.416)	0.403 (1.930)	2.452 (2.013)	-4.527** (1.911)
Dummy for second merger	-1.096* (0.644)	-0.721 (0.622)		-0.458 (0.604)	-1.758** (0.769)	0.290 (0.722)
<i>Macroeconomic variables</i>						
Unemployment rate	1.910** (0.940)	-0.336 (0.923)	0.662 (1.178)	0.818 (0.708)	1.053 (0.859)	-0.177 (0.722)
Inflation rate	-0.681 (0.800)	0.421 (0.635)	-0.108 (0.979)	-0.665 (0.569)	-0.452 (0.635)	0.116 (0.542)
PHP/USD exchange rate	-0.124 (0.125)	0.172 (0.116)	0.032 (0.156)	-0.140 (0.093)	-0.128 (0.117)	0.017 (0.088)
Bank lending rate	0.701 (1.706)	-2.382* (1.338)	1.869 (2.117)	1.820 (1.141)	0.753 (1.394)	-1.261 (1.475)
Reserves requirement ratio (RR)	0.829 (28.597)	29.485 (25.238)	-13.394 (40.939)	-32.898 (23.605)	-23.544 (23.373)	-2.634 (23.088)
RR ²	-0.013 (0.738)	-0.759 (0.654)	0.344 (1.059)	0.855 (0.612)	0.625 (0.604)	0.074 (0.597)
GDP growth rate	-0.437 (0.953)	1.046 (0.698)	-1.181 (1.319)	-0.839 (0.692)	-0.103 (0.887)	0.462 (0.702)
L1.GDP growth	-0.273 (0.307)	0.328 (0.252)	0.192 (0.359)	-0.147 (0.188)	-0.438 (0.273)	0.160 (0.254)
L2.GDP growth	0.343 (0.329)	-0.226 (0.232)	-0.208 (0.372)	0.489** (0.207)	0.677** (0.272)	0.023 (0.230)
L3.GDP growth	0.020 (0.299)	-0.033 (0.182)	0.021 (0.382)	-0.195 (0.209)	-0.014 (0.263)	0.060 (0.169)
L4.GDP growth	-0.510 (0.381)	0.638** (0.297)	-0.588 (0.615)	-0.186 (0.292)	-0.165 (0.360)	0.212 (0.296)
Trend	0.252 (0.185)	-0.206 (0.160)	0.145 (0.232)	0.185 (0.138)	0.120 (0.169)	-0.080 (0.160)
Observations	2,960	3,197	1,395	2,468	2,539	2,696
Number of banks	108	113	61	91	100	99
Adjusted R2	0.655	0.636	0.631	0.496	0.571	0.613
AIC	21844	21561	10471	16461	18847	18430
BIC	22000	21719	10602	16612	18999	18584
p-value (Hansen J statistic)	0.107	0.289	0.945	0.0901	0.231	0.565
p-value (endogeneity test)	0.103	0.0516	0.0105	0.103	0.936	0.274
p-value (Joint test on RR)	0.519	0.285	0.923	0.346	0.164	0.640
p-value (Joint test on Credit Standards)	0.502	0.0437	0.480	0.441	0.523	0.373
p-value (Joint test on GDP growth)	0.422	0.364	0.588	0.167	0.115	0.780
Long-run GDP growth		7.387*		-3.247	-0.186	

Note: Heteroskedasticity-robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3. Estimates for Each NPL Category Using a Model with Liability-/Equity-side Variables

Model:	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Agricultural NPL	SME NPL	Microfinance NPL	Corporate NPL	Consumption NPL	Housing NPL
<i>Bank-specific variables</i>						
Lagged dependent variable	0.785*** (0.027)	0.778*** (0.040)	0.788*** (0.036)	0.737*** (0.056)	0.761*** (0.034)	0.764*** (0.040)
Deposits/Total Assets	0.024 (0.053)	0.042 (0.055)	-0.014 (0.097)	-0.068 (0.064)	-0.079 (0.094)	-0.147*** (0.056)
Equity/Total Assets	0.140** (0.057)	0.076 (0.052)	-0.060 (0.086)	-0.103* (0.060)	0.047 (0.100)	-0.073 (0.103)
Deposit growth	-0.004*** (0.001)	0.003 (0.005)	0.000 (0.002)	-0.000 (0.001)	-0.002 (0.002)	-0.002 (0.002)
Equity growth	-0.739 (0.895)	0.042 (0.076)	-0.015 (0.032)	0.136 (0.432)	0.312 (0.907)	-0.722 (0.778)
Net Interest Income/Average Assets	0.119 (0.330)	-0.117 (0.336)	0.074 (0.134)	-0.248 (0.354)	0.124 (0.277)	0.053 (0.456)
Non-Interest Income/Average Assets	-0.135 (0.260)	-0.464** (0.215)	-0.407* (0.228)	0.177 (0.250)	-0.208 (0.475)	-0.474 (0.328)
Non-Interest Expense/Average Assets	0.645*** (0.207)	0.810*** (0.314)	0.265 (0.176)	0.055 (0.388)	0.156 (0.265)	0.620 (0.430)
Credit standards for Households	0.247 (0.238)	-0.257 (0.166)	-0.042 (0.291)	0.190 (0.173)	0.261 (0.199)	0.070 (0.156)
Credit standards for Enterprises	-0.115 (0.186)	0.348** (0.152)	-0.102 (0.226)	-0.130 (0.130)	-0.166 (0.178)	0.052 (0.146)
Loan demand of Enterprises	0.048 (0.033)	-0.004 (0.023)	-0.041 (0.046)	0.006 (0.027)	0.022 (0.032)	-0.003 (0.023)
Loan demand of Households	0.001 (0.043)	0.025 (0.034)	0.067 (0.051)	-0.021 (0.032)	-0.084* (0.046)	-0.029 (0.034)
Dummy for first merger	-0.049 (1.689)	-0.865 (0.625)	-0.992 (1.474)	-0.537 (1.503)	2.477 (2.068)	-3.699** (1.690)
Dummy for second merger	-1.328* (0.705)	-0.573 (0.719)		-0.485 (0.533)	-1.572* (0.900)	0.339 (0.702)
<i>Macroeconomic variables</i>						
Unemployment rate	2.063** (0.890)	-0.405 (0.635)	0.392 (1.133)	0.670 (0.681)	1.380 (0.889)	0.337 (0.652)
Inflation rate	-0.814 (0.790)	0.583 (0.459)	0.132 (0.843)	-0.531 (0.532)	-0.649 (0.663)	-0.314 (0.494)
PHP/USD exchange rate	-0.179 (0.139)	0.214* (0.110)	0.039 (0.152)	-0.118 (0.090)	-0.148 (0.128)	-0.047 (0.100)
Bank lending rate	1.005 (1.576)	-2.650** (1.137)	1.337 (1.951)	1.528 (1.052)	1.449 (1.461)	-0.368 (1.253)
Reserves requirement ratio (RR)	-1.660 (27.734)	39.600* (20.653)	-8.113 (36.516)	-24.982 (22.580)	-32.100 (25.133)	-13.178 (20.927)
RR^2	0.051 (0.717)	-1.023* (0.534)	0.210 (0.945)	0.652 (0.585)	0.846 (0.649)	0.347 (0.541)
GDP growth rate	-0.712 (0.923)	1.168* (0.646)	-0.839 (1.184)	-0.685 (0.637)	-0.524 (0.896)	-0.091 (0.629)
L1.GDP growth	-0.337 (0.315)	0.357* (0.216)	0.210 (0.359)	-0.093 (0.189)	-0.465 (0.293)	0.053 (0.237)
L2.GDP growth	0.362 (0.327)	-0.342 (0.242)	-0.218 (0.385)	0.440** (0.204)	0.723** (0.283)	0.100 (0.210)
L3.GDP growth	-0.007 (0.305)	0.038 (0.186)	0.094 (0.392)	-0.183 (0.212)	-0.026 (0.261)	0.000 (0.164)
L4.GDP growth	-0.583 (0.368)	0.636** (0.270)	-0.548 (0.565)	-0.120 (0.276)	-0.316 (0.364)	0.059 (0.272)
Trend	0.314* (0.178)	-0.246* (0.137)	0.096 (0.213)	0.156 (0.126)	0.229 (0.171)	0.054 (0.139)
Observations	2,960	3,200	1,398	2,470	2,538	2,696
Number of banks	108	113	61	91	100	99
Adjusted R2	0.653	0.575	0.628	0.503	0.572	0.608
AIC	21854	22041	10524	16441	18815	18468
BIC	22010	22199	10655	16592	18966	18621
p-value (Hansen J statistic)	0.748	0.513	0.608	0.167	0.229	0.399
p-value (endogeneity test)	0.535	0.539	0.127	0.288	0.896	0.130
p-value (Joint test on RR)	0.443	0.158	0.976	0.418	0.131	0.444
p-value (Joint test on Credit Standards)	0.502	0.0507	0.569	0.549	0.403	0.310
p-value (Joint test on GDP growth)	0.461	0.291	0.639	0.209	0.107	0.843
Long-run GDP growth		8.357*		-2.440	-2.545	

Heteroskedasticity-robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Estimates for Each NPL Category Using a Model with Macroeconomic Variables

Model:	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Agricultural NPL	SME NPL	Microfinance NPL	Corporate NPL	Consumption NPL	Housing NPL
Lagged dependent variable	0.799*** (0.025)	0.816*** (0.030)	0.812*** (0.035)	0.735*** (0.054)	0.763*** (0.032)	0.763*** (0.043)
Loan demand of Enterprises	0.020 (0.021)	0.017 (0.014)	-0.031 (0.032)	-0.013 (0.016)	-0.012 (0.024)	-0.020 (0.015)
Loan demand of Households	0.019 (0.029)	-0.022 (0.026)	0.089* (0.046)	-0.002 (0.022)	-0.032 (0.035)	-0.022 (0.022)
Unemployment rate	1.534*** (0.507)	0.930** (0.374)	0.210 (0.804)	0.155 (0.411)	0.410 (0.588)	0.282 (0.437)
Inflation rate	-0.054 (0.208)	-0.179 (0.135)	-0.056 (0.330)	0.063 (0.132)	0.183 (0.208)	-0.002 (0.163)
PHP/USD exchange rate	-0.061 (0.066)	0.117* (0.060)	0.064 (0.100)	-0.039 (0.042)	-0.051 (0.070)	-0.019 (0.060)
Bank lending rate	-0.175 (0.473)	-0.041 (0.345)	0.401 (0.834)	0.376 (0.301)	-0.177 (0.559)	-0.407 (0.422)
Reserves requirement ratio (RR)	21.714* (11.257)	4.823 (7.719)	-6.888 (17.474)	-4.840 (7.519)	0.156 (12.967)	-6.563 (8.490)
RR^2	-0.554* (0.293)	-0.124 (0.202)	0.178 (0.455)	0.130 (0.197)	0.014 (0.340)	0.175 (0.222)
GDP growth rate	0.081 (0.268)	-0.081 (0.190)	-0.695* (0.419)	0.036 (0.182)	0.501 (0.337)	0.008 (0.274)
L1.GDP growth	-0.162 (0.250)	0.038 (0.133)	0.226 (0.303)	0.006 (0.149)	-0.341 (0.225)	0.024 (0.189)
L2.GDP growth	0.139 (0.263)	-0.085 (0.144)	-0.139 (0.283)	0.303 (0.206)	0.518** (0.261)	0.020 (0.157)
L3.GDP growth	0.108 (0.270)	-0.038 (0.149)	-0.026 (0.359)	-0.089 (0.220)	0.069 (0.253)	0.107 (0.161)
L4.GDP growth	-0.455** (0.199)	0.042 (0.111)	-0.326 (0.325)	0.089 (0.154)	-0.056 (0.198)	-0.128 (0.145)
Trend	0.196*** (0.061)	0.056 (0.043)	0.020 (0.084)	0.020 (0.043)	0.041 (0.064)	0.042 (0.048)
Observations	3,001	3,251	1,423	2,502	2,580	2,724
Number of banks	108	113	62	91	100	100
Adjusted R2	0.646	0.652	0.640	0.515	0.582	0.597
AIC	22258	21832	10672	16554	19139	18731
BIC	22348	21923	10751	16641	19227	18820
p-value (Joint test on RR)	0.0291	0.737	0.920	0.626	0.127	0.620
p-value (Joint test on GDP)	0.146	0.948	0.591	0.259	0.218	0.917

Heteroskedasticity-robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5. Estimates for Each NPL Category Using a Model with Asset-side and Liability-/Equity-side Variables

Model:	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Agricultural NPL	SME NPL	Microfinance NPL	Corporate NPL	Consumption NPL	Housing NPL
<i>Bank-specific variables</i>						
Lagged dependent variable	0.781*** (0.028)	0.768*** (0.042)	0.785*** (0.037)	0.732*** (0.057)	0.755*** (0.034)	0.767*** (0.040)
Total Loan per category/Total Assets	-0.052 (0.034)	-0.023 (0.040)	0.059 (0.124)	-0.027 (0.033)	0.039 (0.041)	0.042 (0.028)
ROPA/Total Assets	0.086 (0.112)	0.233* (0.123)	-0.167 (0.137)	0.092 (0.178)	0.038 (0.145)	0.105 (0.086)
TA growth	-3.589 (2.366)	0.328 (3.232)	0.924 (1.101)	-0.499 (0.692)	0.164 (0.598)	-0.515 (1.441)
Loan growth	1.660 (1.566)	-0.618 (2.296)	-0.174 (0.670)	0.263 (0.416)	-1.341* (0.771)	0.511 (1.125)
Deposit growth	-0.003 (0.002)	0.001 (0.003)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.002 (0.002)
Equity growth	-0.017 (0.854)	0.013 (0.044)	-0.011 (0.027)	-0.044 (0.493)	0.585 (0.898)	0.104 (0.732)
Deposits/Total Assets	0.018 (0.052)	0.044 (0.071)	-0.011 (0.096)	-0.064 (0.064)	-0.077 (0.094)	-0.155*** (0.056)
Equity/Total Assets	0.112** (0.056)	0.064 (0.051)	-0.045 (0.090)	-0.098 (0.063)	0.006 (0.098)	-0.098 (0.110)
Net Interest Income/Average Assets	0.065 (0.248)	0.156 (0.382)	-0.079 (0.181)	-0.191 (0.316)	0.244 (0.320)	0.036 (0.487)
Non-Interest Income/Average Assets	-0.188 (0.275)	-0.351** (0.171)	-0.397 (0.250)	0.177 (0.256)	-0.110 (0.498)	-0.498 (0.352)
Non-Interest Expense/Average Assets	0.505*** (0.190)	0.665*** (0.251)	0.307* (0.173)	-0.049 (0.353)	0.394 (0.296)	0.599 (0.439)
Credit standards for Households	0.203 (0.229)	-0.209 (0.161)	-0.111 (0.302)	0.212 (0.180)	0.237 (0.191)	-0.037 (0.163)
Credit standards for Enterprises	-0.088 (0.184)	0.315** (0.145)	-0.070 (0.227)	-0.145 (0.135)	-0.142 (0.172)	0.128 (0.158)
Loan demand of Enterprises	0.040 (0.031)	-0.001 (0.030)	-0.051 (0.048)	0.008 (0.028)	0.022 (0.032)	-0.018 (0.026)
Loan demand of Households	0.017 (0.041)	0.019 (0.043)	0.073 (0.050)	-0.021 (0.034)	-0.082* (0.043)	-0.007 (0.036)
Dummy for first merger	0.374 (1.715)	-1.022 (0.670)	-1.057 (1.563)	-0.072 (1.529)	2.373 (2.043)	-3.986** (1.926)
Dummy for second merger	-1.193* (0.652)	-0.822 (0.664)		-0.448 (0.564)	-1.608* (0.892)	0.536 (0.715)
<i>Macroeconomic variables</i>						
Unemployment rate	1.915** (0.893)	-0.336 (0.831)	0.275 (1.146)	0.730 (0.698)	1.263 (0.867)	0.001 (0.690)
Inflation rate	-0.670 (0.769)	0.484 (0.502)	0.297 (0.873)	-0.605 (0.548)	-0.549 (0.639)	0.038 (0.512)
PHP/USD exchange rate	-0.125 (0.128)	0.177* (0.107)	0.066 (0.149)	-0.129 (0.094)	-0.123 (0.121)	0.030 (0.093)

**Continuation – Table 5. Estimates for Each NPL Category Using a Model with Asset-side and Liability-
/Equity-side Variables**

Model:	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Agricultural NPL	SME NPL	Microfinance NPL	Corporate NPL	Consumption NPL	Housing NPL
Bank lending rate	0.806 (1.588)	-2.375** (1.194)	1.170 (1.969)	1.661 (1.085)	1.230 (1.393)	-0.977 (1.371)
Reserves requirement ratio (RR)	1.504 (26.947)	31.862* (18.398)	0.728 (37.370)	-27.795 (23.431)	-30.355 (23.847)	-1.422 (21.733)
RR^2	-0.031 (0.696)	-0.821* (0.476)	-0.020 (0.968)	0.724 (0.607)	0.802 (0.616)	0.043 (0.562)
GDP growth rate	-0.505 (0.899)	1.069 (0.669)	-0.721 (1.184)	-0.756 (0.668)	-0.360 (0.882)	0.327 (0.654)
L1.GDP growth	-0.301 (0.301)	0.321* (0.193)	0.254 (0.356)	-0.116 (0.189)	-0.427 (0.286)	0.159 (0.249)
L2.GDP growth	0.349 (0.327)	-0.262 (0.186)	-0.275 (0.381)	0.464** (0.205)	0.691** (0.278)	0.018 (0.223)
L3.GDP growth	0.011 (0.300)	-0.000 (0.165)	0.054 (0.397)	-0.194 (0.210)	0.003 (0.264)	0.049 (0.168)
L4.GDP growth	-0.532 (0.359)	0.612** (0.301)	-0.433 (0.567)	-0.144 (0.284)	-0.277 (0.363)	0.173 (0.282)
Trend	0.260 (0.173)	-0.202 (0.162)	0.061 (0.220)	0.175 (0.131)	0.202 (0.167)	-0.034 (0.149)
Observations	2,960	3,196	1,395	2,468	2,538	2,696
Number of banks	108	113	61	91	100	99
Adjusted R2	0.661	0.624	0.626	0.500	0.577	0.608
AIC	21793	21633	10495	16448	18786	18467
BIC	21973	21815	10647	16622	18962	18644
p-value (Hansen J statistic)	0.183	0.429	0.976	0.189	0.491	0.460
p-value (endogeneity test)	0.0928	0.153	0.0291	0.246	0.890	0.0309
p-value (Joint test on RR)	0.573	0.178	0.995	0.390	0.0897	0.552
p-value (Joint test on Credit Standards)	0.568	0.0454	0.505	0.500	0.429	0.402
p-value (Joint test on Δ GDP growth)	0.426	0.359	0.645	0.184	0.100	0.854
Long-run GDP growth		7.490		-2.774	-1.507	

Heteroskedasticity-robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5.2 Macroeconomic determinants

Macroeconomic variables affect both the NPLs of mandatory loans (agricultural and SME NPLs) and regular loans (corporate and consumption NPLs). On the other hand, microfinance and housing NPLs seem to be not sensitive to macroeconomic factors. It should be noted that between 2009 and 2018, the Philippines has robust economic growth and relatively manageable inflation and unemployment rates. Hence, these results might be relevant only during economic progress.

Nevertheless, rising unemployment rates tend to increase agricultural NPLs (estimates around 2% in Model 1 of Tables 2 and 3). Although the unemployment rates in our models might substantially capture unemployment rates in the formal sector, we argue that unemployment rates in the informal labor markets also move in the same direction as those in the formal sector. In the Philippines, agricultural industry employs around 47.4% of the total informal labor force based on 2008 Informal Sector Survey (Philippine Statistics Authority, 2009). These informal workers usually have weak employment security (social security safety nets). Hence, this finding implies that when agricultural borrowers lose their jobs, they will likely be unable to repay their loans resulting to higher NPLs.

Moreover, rising GDP growth rates are likely to contribute to higher SME, corporate, and consumption NPLs. Specifically, 4-quarter lagged GDP growth rates tend to increase SME NPLs (estimates around 0.6% in Model 2 of Tables 2 and 3). In addition, GDP growth has a marginally significant and positive long-term impact on SME NPLs at 10% significance level (estimates around 7.4% in Model 2 of Tables 2 and 3). Similarly, 2-quarter lagged GDP growth rates tend to increase corporate NPLs (estimates around 0.4% in Model 4 of Tables 2 and 3) and consumption NPLs (estimates around 0.7% in Model 5 of Tables 2 and 3). However, GDP growth does not appear to have a long-term impact on corporate and consumption NPLs. These results indicate that the effects of GDP on NPLs tend to be transmitted faster on corporate and consumption loans (six months) than on SME loans (one year). In addition, GDP growth appears to have a stronger quantitative impact of consumption NPLs and a longer impact on SME NPLs.

While the positive coefficient of GDP on NPLs is different from the negative sign found in the literature, it should be noted that our GDP estimate is conditional on loan demand, inflation, lending rates, exchange rates, and unemployment rates unlike in previous studies.¹¹ In addition, the observation period in earlier studies usually include a crisis, while this study covers robust economic growth. There might be substantial differences in risk aversion and risk tolerance of borrowers and banks between sample periods which might possibly be related to GDP. Another plausibly explanation is that banks may become more optimistic about lending and underestimate the credit risk of borrowers during economic booms (Borio et al., 2001; Jimenez & Saurina, 2006). Similarly, borrowers may overestimate their future earnings, avail loans above their current financial capacity, and eventually find themselves unable to repay their debt obligations. Moreover, the positive impact of GDP on NPLs is

¹¹ These studies include the works of Salas and Saurina (2002), Rajan and Dhal (2003), Quagliariello (2007), Espinoza and Prasad (2010), Louzis et al. (2012), Klein (2013), and Lee and Rosenkranz (2019).

aligned with the remarks of IMF (2018), wherein the credit-to-GDP gap in the Philippines is nearing early warning thresholds suggesting an increasing risk in the financial system.

On the other hand, microfinance and housing NPLs do not appear to be sensitive to macroeconomic developments. The finding on housing NPLs provides support on the perceived lower riskiness of residence loans over commercial loans (in our case SME loans) (Borio et al., 2001).

As a robustness check, we combine Equations (1) and (2) and estimate a model with both asset-side and liability-/equity-side variables along with macroeconomic variables. The results are consistent as bank-specific variables (i.e., higher non-interest expense to assets ratio and tighter credit standards for enterprises) will likely lead to more agricultural and SME NPLs, while macroeconomic variables (rising unemployment and higher GDP growth rates) tend to increase agricultural, SME, corporate, and consumption NPLs (Table 5). Furthermore, we confine the sample to banks that did not merge or acquire another bank to eliminate the merger effect, and the said variables are still significant.

Overall, agricultural and SME NPLs (mandatory credits) are susceptible to bank-specific characteristics and macroeconomic conditions. On the other hand, corporate and consumption NPLs (regular loans) are vulnerable to GDP growth but not to bank-specific factors.

6. Conclusion

This study investigates the microeconomic and macroeconomic determinants of NPLs in the Philippines across six loan categories (i.e., agricultural, microfinance, small- and medium-enterprises (SME), corporate, consumption, and housing loans).

Previous NPLs seem to be the leading indicator of current NPLs suggesting its persistence over time. Thus, bank supervisors should encourage banks to implement effective NPL resolutions and early loan remedial strategies to arrest possible accumulation of NPLs. In addition, bank-specific characteristics and macroeconomic conditions are likely to affect agricultural and SME NPLs (mandatory loans), while only macroeconomic factors seem to have an impact on corporate and consumption NPLs (regular loans).

In particular, cost-inefficient banks tend to have higher agricultural and SME NPLs indicating that the loan quality of these two mandatory credits is associated with operational inefficiency. Additionally, rising unemployment rates seem to increase agricultural NPLs. Hence, bank supervisors should encourage banks to improve their loan monitoring and collection efforts particularly on agricultural and SME loans as well as offer loan restructuring program whose repayment terms are aligned with borrowers' cash flows. Moreover, highly capitalized banks tend to have more agricultural NPLs implying higher credit risk for agricultural loans. Bank regulators can consider providing regulatory incentives on agricultural lending to encourage banks' compliance with the mandatory credit allocation and to compensate for the higher risk of agricultural loans.

Meanwhile, higher SME NPLs are associated with tighter credit standards. In addition, rising GDP growth rates are likely to contribute to higher SME NPLs and the impact tends to last for a long period. Taken together, these two findings suggest a deterioration in SME loan quality and a possible credit risk build-up in SME lending segment of banks along with Philippine economic progress. Similarly, higher GDP growth rates tend to increase corporate and consumption NPLs (regular loans). However, microfinance and housing NPLs seem to be not sensitive to macroeconomic developments. Thus, bank supervisors could take into consideration the vulnerabilities of NPLs to macroeconomic conditions when assessing banks' NPLs and the appropriateness of loan loss provisions. Furthermore, bank supervisors could strengthen the credit risk management regulations particularly on establishing borrowers' financial capacity to repay their debt obligations.

An immediate extension of this study is a research on macroprudential stress testing across different loan categories while taking into consideration the results of this paper.

References

- Abadie, A., Athey, S., Imbens, G., & Wooldridge, J. (2017). When should you adjust standard errors for clustering? National Bureau of Economic Research Working Paper No. 24003. <http://doi.org/10.3386/w24003>
- Ari, A., Chen, S., & Ratnovski, L. (2019). The dynamics of non-performing loans during banking crises: A new database. Working Paper No. 19/272. International Monetary Fund. <https://www.imf.org/en/Publications/WP/Issues/2019/12/06/The-Dynamics-of-Non-Performing-Loans-during-Banking-Crises-A-New-Database-48839>
- Bangko Sentral ng Pilipinas. (2011). *Bank lending standards generally unchanged in Q4 2010 relative to Q3 2010*. <http://www.bsp.gov.ph/publications/media.asp?id=2503&yr=2011>
- Bangko Sentral ng Pilipinas. (2017a). *Bank lending standards remain broadly steady in Q4 2016*. <http://www.bsp.gov.ph/publications/media.asp?id=4279>
- Bangko Sentral ng Pilipinas. (2017b). *Manual of regulations for banks*. <http://www.bsp.gov.ph/downloads/Regulations/MORB/Sep2017MORB1.pdf>
- Bangko Sentral ng Pilipinas. (2019). *Report on the Philippine financial system*. http://www.bsp.gov.ph/downloads/Publications/2019/StatRep_1Sem2019.pdf
- Baudino, P. & Yun, H. (2017). *Resolution of non-performing loans – Policy options*. FSI Insights on policy implementation No. 3. Bank for International Settlements. <https://www.bis.org/fsi/publ/insights3.pdf>
- Berger, A. N. & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance*, 21(6), 849–870. [https://doi.org/10.1016/S0378-4266\(97\)00003-4](https://doi.org/10.1016/S0378-4266(97)00003-4)
- Berger, A. N. & Udell, G. F. (1990). Collateral, loan quality, and bank risk. *Journal of Monetary Economics*, 25(1), 21-42. [https://doi.org/10.1016/03043932\(90\)90042-3](https://doi.org/10.1016/03043932(90)90042-3)
- Borio, C., Furfine, C., & Lowe, P. (2001). *Procyclicality of the financial system and financial stability: Issues and policy options*. BIS Papers No. 1. Bank for International Settlements. <https://www.bis.org/publ/bppdf/bispap01a.pdf>
- Cameron, A. C. & Trivedi, P. K. (2005). *Microeconometrics: Methods and applications*. Cambridge University Press.
- Clair, R. T. (1992). Loan growth and loan quality: Some preliminary evidence from Texas banks. *Economic and Financial Review*, Third Quarter, 9-22. Federal Reserve Bank of Dallas. <https://www.dallasfed.org/~media/documents/research/er/1992/er9203b.pdf>

- Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, 20(2), 249-272. [https://doi.org/10.1016/S0261-5606\(00\)00048-6](https://doi.org/10.1016/S0261-5606(00)00048-6)
- Espinoza, R. & Prasad, A. (2010). Non-performing loans in the GCC banking systems and their macroeconomic effects. Working Paper No. 10/224. International Monetary Fund. <https://www.imf.org/external/pubs/ft/wp/2010/wp10224.pdf>
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46(6), 1251–1271. <https://doi.org/10.2307/1913827>
- International Monetary Fund. (2018). *The Philippines' economic outlook in six charts*. <https://www.imf.org/en/News/Articles/2018/09/27/na092718-the-philippines-economic-outlook-in-six-charts>
- International Monetary Fund. (2019). *The IMF 2019 financial soundness indicators compilation guide*. <https://www.imf.org/en/Data%20/Statistics/FSI-guide>
- Jiménez, G. & Saurina, J. (2006). Credit cycles, credit risk, and prudential regulation. *International Journal of Central Banking*, 2(2), 65-98. <https://ideas.repec.org/a/ijc/ijcjou/y2006q2a3.html>
- Klein, N. (2013). Non-performing loans in CESEE: Determinants and impact on macroeconomic performance. Working Paper No. 13/72. International Monetary Fund. <https://www.imf.org/external/pubs/ft/wp/2013/wp1372.pdf>
- Lawrence, E. C. (1995). Consumer default and the life cycle model. *Journal of Money, Credit and Banking*, 27(4), 939-954. <http://dx.doi.org/10.2307/2077781>
- Lee, J. & Rosenkranz, P. (2019). Non-performing loans in Asia: Determinants and macrofinancial linkages. Economics Working Paper No. 574. Asian Development Bank. <http://dx.doi.org/10.22617/WPS190050-2>
- Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking and Finance*, 36(4), 1012-1027. <https://doi.org/10.1016/j.jbankfin.2011.10.012>
- Lown, C. S. & Morgan, D. P. (2006). The credit cycle and the business cycle: New findings using the loan officer opinion survey. *Journal of Money, Credit, and Banking*, 38(6), 1575-1597. <https://www.jstor.org/stable/3839114>
- Nickell, S. (1981). Biases in dynamic models with fixed effects. *Econometrica*, 49(6), 1417–1426. <http://doi.org/10.2307/1911408>
- Organization for Economic Cooperation and Development. (2018). SME policy index: ASEAN 2018 boosting competitiveness and inclusive growth. <https://doi.org/10.1787/9789264305328-en>

- Philippine Statistics Authority. (2009). Results from the 2008 informal sector survey. <https://psa.gov.ph/content/informal-sector-operators-counted-105-million-results-2008-informal-sector-survey>
- Podpiera, J. & Weill, L. (2008). Bad luck or bad management? Emerging banking market experience. *Journal of Financial Stability*, 4(2), 135–148. <https://doi.org/10.1016/j.jfs.2008.01.005>
- Quagliariello, M. (2007). Banks' riskiness over the business cycle: A panel analysis on Italian intermediaries. *Applied Financial Economics*, 17(2), 119-138. <https://doi.org/10.1080/09603100500486501>
- Rajan, R. & Dhal, S. C. (2003). Non-performing loans and terms of credit of public sector banks in India: An empirical assessment. Occasional Paper No. 24(3). Reserve Bank of India. <https://rbidocs.rbi.org.in/rdocs/publications/pdfs/60613.pdf>
- Salas, V. & Saurina, J. (2002). Credit risk in two institutional regimes: Spanish commercial and savings banks. *Journal of Financial Services Research*, 22(3), 203–224. <http://doi.org/10.1023/A:1019781109676>
- Schaffer, M. E. (2005). Xtvivreg2: Stata module to perform extended IV/2SLS, GMM and AC/HAC, LIML and K-class regression for panel data models. Statistical Software Components S456501. Boston College Department of Economics. <https://ideas.repec.org/c/boc/bocode/s456501.html>
- Staiger, D. & Stock, J. H. (1997): Instrumental variables regression with weak instruments. *Econometrica*, 65(3), 557–586. <http://doi.org/10.2307/2171753>
- Stock J. & Yogo, M. (2002). Testing for weak instruments in linear IV regression. Technical Working Paper No. 284. National Bureau of Economic Research. <http://doi.org/10.3386/t0284>
- Williams, J. (2004). Determining management behaviour in European banking. *Journal of Banking and Finance*, 28(10), 2427–2460. <https://doi.org/10.1016/j.jbankfin.2003.09.010>

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