



Determinants of non-performing loans: Evidence from Euro-area countries



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ABSTRACT

The objective of this paper is to identify the main determinants of non-performing loans in the euro-area banking system for the period 1990Q1–2015Q2 using GMM estimations. On top of the bank- and country-specific variables proposed by the literature the roles of income tax and output gap are for the first time examined and found to be significant. Our results could be helpful when designing macro-prudential and fiscal policies.

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1. Introduction

Bank insolvency has been a significant problem in many countries all over the world. One of the main reasons for insolvent banks is the asset quality deterioration especially post-2007. Euro-area non-performing loans, i.e., loans past due > 90 days (NPLs), exceeded 12% in 2015 and put increasing pressure on banks' balance sheets preventing them from pursuing their intermediation role and creating further growth. Hence, uncovering the determinants of the NPLs is of major interest for policy purposes.

Recent literature has distinguished two sources of factors responsible for increasing NPLs: bank-specific and country-specific. Berger and DeYoung (1997) used Granger-causality techniques to test four bank management-related hypotheses regarding the relationship among loan quality, cost efficiency and bank capital. They concluded that the bad management and moral hazard hypotheses were explaining a significant part of NPLs. Podpiera and Weill (2008) also estimated a causal relationship between NPLs and cost efficiency (sign of bad management), while Ghosh (2006) found that lagged leverage affects NPLs. Espinoza and Prasad (2010) and Kauko (2012) introducing macro variables found that NPLs decline with growth and rise with interest rates and fiscal and external deficits. Louzis *et al.* (2010), estimated the factors that affect NPLs for each loan category (mortgage, business and consumer) separately. Their results show that NPLs are significantly related to macro variables and the quality of management. Cifter (2015) focused on how bank concentration affects NPLs with ambiguous results. Beck *et al.* (2015), estimated that the most significant factors affecting NPLs are GDP growth (major driver

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Table 1
Panel unit roots test.

Variables	Fisher Type-ADF (p-values)	Fisher Type-ADF (statistics)
NPL	0.0000	−8.6457
ROE	0.0000	−20.6897
ROA	0.0000	−21.8409
UNEMP	0.0000	−18.9970
TAXINC	0.0000	−16.8751
GROWTH	0.0000	−42.6211
INFLRAT	0.0000	−41.6294
DEBT	0.9991	3.1142
FISCAL	0.0000	−25.5489
LTD	0.0000	−18.3976
OUTPUT_GAP	0.0000	−41.5660

Source: DataStream, own estimations

Notes: NPL, ROE, ROA, UNEMP, TAXINC,, GROWTH, INFLRAT, DEBT, FISCAL, LTD, OUTPUT_GAP denote the non-performing loans ratio, return on equity, return on assets, unemployment, income tax, growth, inflation rate, government debt as % of GDP, government budget deficit or surplus as % of GDP, loans to deposits ratio and output gap respectively. For this test the null hypothesis of unit root is tested against the alternative of stationarity.

during the last decade), share prices, interest rates and the exchange rate. [Nkusu \(2011\)](#) found that an aggravation in the macroeconomic environment as proxied by sluggish growth, decreasing asset prices or higher unemployment is interrelated with debt service problems. On the contrary, improving macroeconomic conditions reduce NPLs. The main findings of [Messai \(2013\)](#) were that on top of GDP growth, ROA has a negative effect on NPLs, while unemployment and the real interest rate influence NPLs positively. [Ghosh \(2015\)](#) noted that the variables related to NPL increases are poor credit quality, liquidity risk, inefficiency cost, larger capitalization and the size of the banking industry as well as unemployment, inflation, and public debt. [Ozili \(2015\)](#) tried to address the issue of the interaction between non-performing loans and the stage of the business cycle.

2. Models and econometric estimation

In this paper we employ both country-specific and bank-specific variables affecting NPLs taking quarterly data in an unbalanced panel. We estimate three static and three dynamic types of models introducing first macroeconomic variables only, then bank-specific variables only and, finally, both in a static and a dynamic framework. We introduced two new variables stemming from the theoretical literature in order to test their explanatory power. They are the income tax rate as % of GDP and the output gap. If a borrower has to pay higher income tax his disposable income will be reduced and, hence, his capacity to pay back his debt to the bank will follow suit. Output gap is a proxy of the business cycle and as such it is expected to affect NPLs negatively. Our results confirm the earlier literature on NPLs and the importance of our new variables.

We focus on commercial banks from 15 euro-area countries from 1990Q1 to 2015Q2.¹ The bank-specific variables used were ROA, ROE and the ratio of loans to deposits as proxies for quality and riskiness of management. The country-specific determinants are unemployment, income tax as % of GDP, government budget deficit/surplus and public debt as % of GDP, inflation, GDP growth and output gap. Such macro variables have been found to affect the vulnerability of the banking sector and, thus, enhance the explanatory power of the empirical model. Details for each variable are provided below:

NPLs: the ratio of non-performing loans to total loans is the dependent variable.

ROA and ROE: reveal the managerial efficiency of a bank to convert its assets and equity into returns (profits). Good management should lead to lower NPLs.

LTD: an increasing loans to deposits ratio reveals a risk preference and is expected to lead to higher NPLs.

UNEMP: increasing unemployment makes more borrowers unable to meet their debt obligations.

TAXINC: is expressed as % of GDP. As taxed (personal) income increases, disposable income and capacity to pay loans back are reduced.

FISCAL: stands for the Government budget balance as % of GDP which (together with DEBT) may affect NPLs in an ambiguous way, e.g., when an expansionary fiscal policy alleviates/worsens the NPL problem.

DEBT: the general gross government debt as % of GDP.

GROWTH: the percentage growth rate of real GDP is anticipated to have a negative effect on NPLs.

INFLRAT: the inflation rate is proxied by the percentage change of the CPI and is thought to improve loan repayment since it makes it cheaper.

¹ The omitted euro-area countries are Malta, Estonia, Latvia and Cyprus because not enough bank-specific data could be found on them.

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