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Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios

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ABSTRACT

This paper uses dynamic panel data methods to examine the determinants of non-performing loans (NPLs) in the Greek banking sector, separately for each loan category (consumer loans, business loans and mortgages). The study is motivated by the hypothesis that both macroeconomic and bank-specific variables have an effect on loan quality and that these effects vary between different loan categories. The results show that, for all loan categories, NPLs in the Greek banking system can be explained mainly by macroeconomic variables (GDP, unemployment, interest rates, public debt) and management quality. Differences in the quantitative impact of macroeconomic factors among loan categories are evident, with non-performing mortgages being the least responsive to changes in the macroeconomic conditions.

1. Introduction

Exploring the determinants of ex post credit risk is an issue of substantial importance for regulatory authorities concerned with financial stability and for banks' management. The ex post credit risk takes the form of Non-Performing Loans (NPLs). Reinhart and Rogoff (2010) point out that NPLs can be used to mark the onset of a banking crisis.

In the majority of studies that investigate the determinants of NPLs, the aggregate level of NPLs is considered and either macroeconomic or bank-specific determinants (but not both) are used as explanatory variables. Exceptions include Salas and Saurina (2002) who combine macroeconomic and microeconomic variables to explain aggregate NPLs of Spanish Commercial and Savings Banks for the period 1985–1997. They focus on the NPLs determinants for commercial and savings banks and find that bank-specific determinants can serve as early warning indicators for future changes in NPLs. Other similar studies include Clair (1992) and González-Hermosillo et al. (1997).

Most empirical studies examine the influence of the macroeconomic environment on NPLs. Rinaldi and Sanchis-Arellano (2006) analyze household NPLs for a panel of European countries and provide empirical evidence that disposable income, unemployment and monetary conditions have a strong impact on NPLs. Berge and Boye (2007) find that problem loans are highly sensitive to the real interest rates and unemployment for the Nordic banking system over the period 1993–2005. Boss et al. (2009) examine the coupling of credit risk of the main Austrian corporate sectors with the business cycle. Other studies focusing on the macroeconomic determinants of NPLs include Cifter et al. (2009), Nkusu (2011) and Segoviano et al. (2006).

Another strand of the literature emphasizes the effect of bank-specific characteristics on problem loans. Berger and DeYoung (1997) draw attention to the links between bank-specific characteristics and focus on efficiency indicators and problem loans. Specifically, Berger and Young formulate possible mechanisms, namely 'bad luck', 'bad management', 'skimping' and 'moral hazard', relating efficiency and capital adequacy. They test the derived hypotheses for a sample of US commercial banks spanning the period from 1985 to 1994 and conclude that, generally, decreases in measured cost efficiency lead to increased future problem loans. Podpiera and Weill (2008) continue along this line of research and examine the relationship between efficiency and bad loans

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in the Czech banking industry from 1994 to 2005. They also provide empirical evidence in favor of a negative relationship between decreased cost efficiency and future NPLs. Both papers focus solely on bank-specific determinants. Li et al. (2007) finds that incentive contracts have a positive effect on managerial efforts to reduce NPLs in the Chinese banking system. Finally, Breuer (2006) examines the influence of a very wide range of institutional variables on NPLs.

The present study aims to contribute to the NPLs literature in three ways. First, we examine the determinants of NPLs across different loan categories, rather than the aggregate level of NPLs. The majority of previous studies focuses on aggregate NPLs. This approach may obscure significant channels through which credit risk fluctuates.[1] In particular, macroeconomic and bank-specific variables may impact each type of NPLs in a different way. This can be attributed to institutional settings creating different incentive structures for each loan type with regard to the costs of bankruptcy.[2,3] Moreover, differences in the sensitivity of various NPLs categories to macroeconomic developments may be related to differential effects of the business cycle, especially economic downturns, on agents' cash flows and collateralized assets' values. Therefore, we distinguish between consumer, business and mortgage loans and investigate separately their corresponding determinants.

Second, the paper focuses on the Greek banking system, which due to the recent economic developments in Greece, may serve as a benchmark for the study of the public debt and banking crisis nexus. Reinhart and Rogoff (2009), for instance, concentrate on the temporal direction from a banking crisis to a debt crisis, motivated by the financial turmoil in the US. The case of Greece, however, provides an example of a fragile public finance condition leading to a deterioration of the NPLs. In this paper we investigate the effect of the sovereign debt on the banking system through the NPLs.

Finally, the paper considers two distinct types of determinants, namely macroeconomic (systematic) and bank-specific (idiosyncratic). Our aim is to identify the most significant bank-specific determinants, after controlling for the macroeconomic environment. The methodology is to estimate a baseline model, which includes only general macroeconomic indicators and then examine if the addition of bank-specific variables contributes to the explanatory power of the model. The choice of the bank-specific variables is based on hypotheses which have been put forward in the literature. Under the assumption that the macroeconomic situation and the business cycle constitute fundamental determinants of NPLs for all types of loans, this approach enables us to isolate the bank-specific features, which have an impact on NPLs per type of loan.

There is no standardized approach to analyze the factors influencing NPLs in the literature. Data availability represents a major limitation, constraining to a large extent the methodological options available. This paper utilizes a panel data set comprising nine Greek commercial banks spanning from the first quarter of 2003 to the third quarter of 2009 and a loan portfolio broken down into mortgage, business and consumer loans. Our results are intuitively expected but have not been documented before. For example, empirical evidence is provided that macroeconomic and bank-specific variables should be combined when modeling the NPLs evolution and we show that there exist both qualitative and quantitative differences among the effects of these variables on the various NPL categories.

The rest of the paper is organized as follows. Section 2 briefly presents the evolution of NPLs in the Greek banking system. Section 3 provides an overview of the theoretical and empirical literature on the determinants of problem loans and formulates the hypotheses relating bank-specific variables to NPLs. Section 4 describes the econometric methodology, while Section 5 presents the results of the empirical analysis. Finally, Section 6 summarizes our findings.

2. Evolution of non-performing loans in the Greek banking system

Before the liberalization of the Greek financial sector, which started in the early 1990s, the regulatory restrictions determined to a large extent the risk attitude of the banking institutions. According to (Tsakalotos, 1991, quoted in Gibson and Tsakalotos, 1992) decisions on extending bank credit were frequently made on the basis of non-banking criteria such as "personal contacts and social pressure" which lead to inefficiency as regards risk management and to problems with NPLs.

On the contrary, the changing economic environment within which the banks operated, and which was clarified around the late-1990s,[4] changed the mode of operation of Greek banks with regard to the way they handled risk. In order to achieve satisfactory levels of profitability and survive in the face of intensified competition, as a result of financial liberalization, the banks were forced to improve their risk management efficiency and adopt sophisticated technology.

Taking into account the evolution of the banking sector in Greece it is logical to assume that the determinants of NPLs must have changed over time. In the place of determinants related to public policy directions, market forces are expected to have taken over as the major drivers of NPLs. Our investigation is thus restricted to the post-liberalization time period.

Since the 2000s the Greek banking system can certainly be characterized as a relatively mature financial sector, where market forces govern its functioning. This period encompasses a part of the booming period (which started since the mid-1990s) and the current financial crisis. Therefore, all phases of the business cycle are included in our empirical analysis.

In addition to the concerns raised by the current financial crisis for a further NPL ratio deterioration, the steep credit expansion, which occurred during this decade (see Fig. 1), also poses the question whether the quality of loans granted during this euphoric period was accurately evaluated by the banking system. Generally, the high rates of credit growth during the 2000s can be attributed to rightward shifts in both the demand and the supply curves. On the supply side, the liberalization of the financial system, which took place in the 1990s and the ensuing competition between banks for market share, fueled credit growth. On the demand side, the increase in debt ceilings, brought about by bank competition, induced households to attempt to smooth their consumption through borrowing.[5] Furthermore, high rates of growth that prevailed in Greece since the mid-1990s,[6] motivated firms to undertake

[1] Sinkey and Greenawalt (1991) analyze the determinants of loan loss rates, separately for various loan classes.

[2] For an international comparison of bankruptcy laws see Kolecek (2008).

[3] The regulatory framework e.g. the time period within which banks are obliged to write off NPLs is another factor that affects the observed value of NPLs.

[4] Eichengreen and Gibson (2001) provide a comprehensive review of the Greek banking sector's development during the 1990s.

[5] In a theoretical contribution, Antzoulatos (1994) argues (using a stochastic optimization framework) that increases in the debt ceiling may lead to increases in optimal consumption. Debt ceiling is assumed to be exogenous in his model, so that one can interpret it as a choice variable for bank policy. Antzoulatos links this theoretical result with the observed decrease in savings, presumably related to improved consumer access to credit (caused by financial deregulation), across a diverse set of countries. Furthermore, the proposed model implies that improved access to credit primarily affects middle-income groups.

[6] For a periodization of the growth phases for the Greek economy see Bosworth and Kollintzas (2001).