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Non performing loans (NPLs) in a crisis economy: Long-run equilibrium analysis with a real time VEC model for Greece (2001–2015)[☆]

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HIGHLIGHTS

- We shed light on non-performing loans in the Greek banking sector.
- We use a real-time Vector Error Correction model to capture dynamic interdependencies.
- We find that macroeconomic and financial factors have a significant impact on NPLs.
- The deteriorating credit quality feeds back into the economy leading to a self-reinforcing negative loop.

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ABSTRACT

As a result of domestic and international factors, the Greek economy faced a severe crisis which is directly comparable only to the Great Recession. In this context, a prominent victim of this situation was the country's banking system. This paper attempts to shed light on the determining factors of non-performing loans in the Greek banking sector. The analysis presents empirical evidence from the Greek economy, using aggregate data on a quarterly basis, in the time period 2001–2015, fully capturing the recent recession. In this work, we use a relevant econometric framework based on a real time Vector Autoregressive (VAR)—Vector Error Correction (VEC) model, which captures the dynamic interdependencies among the variables used. Consistent with international evidence, the empirical findings show that both macroeconomic and financial factors have a significant impact on non-performing loans in the country. Meanwhile, the deteriorating credit quality feeds back into the economy leading to a self-reinforcing negative loop.

1. Introduction

Until recently, Greece had the 22nd highest standard of living in the world [1] and, according to Eurostat [2], Gross Domestic Product (GDP) per inhabitant stood at 95% of the EU average. OECD [3] characterized the performance of the

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Greek economy since the early 1990s "remarkable", stressing the prevalence of high growth rates ranking second after Ireland among OECD countries. According to OECD [4], this performance was primarily due to financial liberalization, EMU membership, growing exports and the Olympic Games in 2004.

However, as a result of domestic and international factors its debt rose from 105% of GDP (2007) to 170% (2011). In 2013, the proportion of the population in Greece living under the poverty threshold was equal to 23.1%, which is a record value since the 1990s and significantly above the EU-27 average of 16.6% [5]. In brief, the Greek crisis has reached points that are directly comparable only to the Great Recession including an approximate −25% contraction of GDP in the period 2008–2013 and a very high unemployment rate at 27%, with youth unemployment at 60% approximately. Cut backs in real wages are equal to −30% approximately, followed by a dramatic rise in suicides.

In such turbulent environments, the banking sector and especially commercial banks face elevated credit risk caused by the decreased cash flows of their borrowers. The corporate borrowers may have been impacted by weak demand for their products, while the household borrowers may receive lower income payments because of wage cuts or because they have become unemployed. In addition, the incentives of borrowers to repay their mortgages may have weakened in the face of adverse house price developments, possibly leading them into a state of negative equity (i.e. the price of the property being lower than the corresponding mortgage).

Consequently, it is widely accepted that the quantity or percentage of non-performing loans[1] (NPLs) is often associated with bank failures and financial crises in both developing and developed countries, as banks may face losses which undermine their solvency (e.g. Sorge [6]). The exploration of the determining factors of NPLs ratio, which can be used as a proxy for"ex post" credit risk, is an issue of substantial importance for regulatory authorities concerned about financial stability, while it presents great interest as a research topic. Despite the fact that banks have developed sophisticated models for quantifying "ex ante" credit risk, empirical studies have shown that "ex post" credit risk, as reflected in the number of non-performing loans, is mainly affected: (1) by macroeconomic factors (GDP cycle, unemployment rate, etc.) and (2) by financial/bank-specific factors (credit growth, etc.), i.e. factors which go beyond the microeconomic modeling, at the level of the borrower, which is conducted by each bank.

The present study attempts to identify the determinants of non-performing loans in the Greek banking sector and, more broadly, their dependence with the economy, using aggregate data and a real-time Vector Autoregressive (VAR)—Vector Error Correction (VEC) model. We employ a number of relevant econometric tests to identify the properties of the data, such as their order of integration, the causality from a number of potential determinants towards NPLs and their mutual equilibrium relations. The study spans the period 2001Q4–2015Q1. The period under investigation includes both the growth phase (which began in the mid-1990s) as well as the downturn, following the global financial crisis and the Greek debt crisis. Therefore, our study benefits from the examination of a through-the-cycle sample enhancing the reliability of our results. This is the first empirical study in the literature which investigates the determinants of non-performing loans in Greece using aggregate data.

The banking system of Greece represents a "clean" prototype case for the empirical investigation of the determinants of non-performing loans. Specifically, the banks in Greece operate within a liberalized institutional environment, in the context of an advanced and closed economy which was growing rapidly, until the outbreak of the crisis. Furthermore, banks follow a traditional business model involving mainly deposit-taking and loan-granting while their trading activities are relatively limited and the shadow banking sector is not developed. Finally, the value of the currency is stable due to the participation of Greece in the Eurozone.

The aforementioned features of the macroeconomic and banking environment ensure that there is no significant impact by additional complicating factors which may be present in other jurisdictions, such as banks being highly involved in trading or originate-to-distribute activities, or swings in international trade or exchange rates affecting the macroeconomic environment, or, finally, issues of financial underdevelopment impacting on the evolution of banks' profitability.

The remainder of the study is organized as follows: Section 2 provides a comprehensive review of the empirical literature on non-performing loans. Section 3 analyzes the theoretical framework and the variables used; Section 4 sets out the econometric methodology used. Section 5 presents the results of our empirical analysis. Finally, Section 6 concludes.

2. Background literature

2.1. On non-performing loans

Over the last few years, the literature that examines non-performing loans has expanded in line with the interest afforded to understanding the factors responsible for financial vulnerability. This situation may be attributed to the fact that the quantity of non-performing loans, as we have already mentioned, is often associated with bank failures and financial crises in both developing and developed countries. In this section, we review the existing literature so as to formulate a theoretical framework to investigate the determinants of non-performing loans in Greece.

[1] A non-performing loan is a loan that is in default or close to being in default. Many loans become non-performing after being in default for 90 days, but this can depend on the contract terms.