



Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states



Amit Ghosh*

Department of Economics, Illinois Wesleyan University, 1312 Park Street, PO Box 2900, Bloomington, IL 61702-2900, USA

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ABSTRACT

The present study examines state-level banking-industry specific as well as region economic determinants of non-performing loans for all commercial banks and savings institutions across 50 US states and the District of Columbia for 1984–2013. Using both fixed effects and dynamic-GMM estimations, I find greater capitalization, liquidity risks, poor credit quality, greater cost inefficiency and banking industry size to significantly increase NPLs, while greater bank profitability lowers NPLs. Moreover, higher state real GDP and real personal income growth rates, and changes in state housing price index reduce NPLs, while inflation, state unemployment rates, and US public debt significantly increase NPLs. The findings imply that regular stress tests on banks' loan quality that typically underpin scenarios for a rise in NPLs, should take into account the impact of 'micro' or state-level economic conditions on NPLs, in addition to banks' capital and credit quality, and effective cost management in assessing banks financial health.

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1. Introduction

The recent global financial crisis (henceforth GFC) was marked by a surge in non-performing loans (henceforth NPLs) in most nations including different regions across the US. A rising share of NPLs in the loan portfolio of banks signifies greater risks affecting both the liquidity and profitability of banks. Moreover, it represents a deteriorating balance sheet of banks. Since the GFC, NPLs are especially in the spotlight for both regulators and banks as it has been linked to bank failures, and is often a harbinger to banking crises.¹ Indeed, the increase in loan defaults, mortgage foreclosures along with a simultaneous rise in NPLs across states in the US, underscores the links between regional and national macro-financial shocks, and banking sector vulnerability. This deterioration of banks asset

quality is not only financially destabilizing for the banking system but may also reduce economic efficiency, impair social welfare and decline economic activity.² In fact, many banking analysts have alluded NPLs as “financial pollution” due to their adverse economic consequences (Barseghyan, 2010; Gonzales-Hermosillo, 1999; Zeng, 2012). Hence, minimization of NPLs is necessary to restore a sounder banking system and foster overall financial stability in the aftermath of The Great Recession.

However, any policy response by banking regulatory authorities in the resolution of NPLs problem first requires a deeper understanding of its underlying determinants. The present study examines both state-level banking-industry specific as well as region economic determinants of NPLs across all 50 US states

* Tel.: +1 309 556 3191.

E-mail address: aghosh@iwu.edu

¹ Of course other factors that affect bank defaults and failure have recently come to the forefront of discussions as well. These include the role of distance-to-default, captured by per cent loss of share price, as a predictor of bank failure, in the one-period contingent-claims model of bank debt and equity pricing of Milne (2014).

² The impact of NPLs on the slowdown of an economy has been calibrated by Barseghyan (2010) in the context of the “lost decade” of 1990s for the Japanese economy. The theoretical foundations of such analysis involve a general equilibrium framework: a two country overlapping generations model (OLG) comprising of households, firms, banking sector and the government. Under such a framework, government provides deposit insurance to the banks. However, with a delay in government bailout, NPLs cause a decline in economic activity by crowding out capital.

and the District of Columbia spanning the longest time period of 1984–2013. Therefore, this study has a practical use in the macro-economic analysis of the dynamics of lending and asset quality in the US banking industry.

An important responsibility of the central bank or any banking supervisory authority is to ensure a stable and efficient financial system that safeguards the interest of all participating agents. A mainstay of financial stability is a sound banking system that efficiently channelizes funds between borrowers and savers. It is in regard to prudential banking supervision bank stress tests are most useful. NPL modeling is very often used by central banks within the stress test methodology (Buncic and Melecky, 2012; Marcelo et al., 2008). So from the perspective of restoring both financial stability as well as confidence in financial markets in the US, the findings of this study bear relevance for stress tests of loan quality. Moreover, insights can be gained about future levels of problem loans and probabilities of failure, which are of direct interest to both regional and federal supervisors as well as market analysts.

The role of regional economic indicators in influencing NPLs is especially motivated by the fact that many states with large declines in house prices also experienced relatively large declines in personal income, state GDP and relatively large increases in unemployment rates. Hence, it remains interesting to consider the extent to which NPLs are associated with changes in state-level economic conditions in the US. Given the importance of this topic, to the best of my knowledge, the present study is the first of its kind that exploits the determinants of NPLs in both commercial banks and savings institutions in the US, especially bringing forward the role of regional banking and economic conditions.³ Using state as a political unit is further justified on the grounds that most banks in the US operate in either one or a few states only. Thus using state-level variables allows to better exploit the dynamics between the regional economic conditions and state-level NPLs. Such an exercise is also useful to evaluate the relative importance of state-banking industry level vis-a-vis regional economic factors in affecting NPLs.

The remainder of the paper proceeds as follows: Section 2 provides a survey of recent pertinent literature on NPLs. Section 3 introduces the relevant determinants of NPLs and their theoretical underpinnings. Section 4 provides some trends and patterns in the data as well as statistical diagnostic tests. Section 5 presents the estimation models and discusses the results. Finally, Section 6 concludes.

2. Literature survey of recent NPL literature

The recent GFC has sparked an interest in understanding the drivers of NPLs in different regions of the world. These have ranged from cross-country analysis i.e. panel data models to country-specific case studies. The empirical literature on the determinants of NPLs is based on theoretical models that deal with the business cycle with an explicit role for financial intermediation. The financial accelerator theory as discussed in Bernanke and Gertler (1989), Kiyotaki and Moore (1997), is the widely used theoretical framework to link NPLs with a nation's macroeconomic environment.

The macroeconomic determinants of NPLs can be also traced to the theoretical literature on life-cycle consumption models such as Lawrence (1995) that introduces explicitly the probability of default. Such models imply that borrowers with low incomes have higher rates of default due to increased risk of facing unemployment and being unable to settle their obligations. Additionally,

banks charge higher interest rates to riskier clients. Thus, the default probability depends on current income and the unemployment rate, which is linked to the uncertainty regarding future income and the lending rates. I next survey the very recent literature here.

Much like in the US, the banking industry in several European nations was also plagued recently by surges in NPLs. This has sparked a burgeoning body of literature in studying NPLs across the Atlantic. Using bank-level data, Klein (2013) investigates NPLs in 16 Central, Eastern and South-Eastern European nations, and find both bank-specific as well as macroeconomic factors to influence NPLs. Skarica (2014) uses quarterly data from 2007 to 2012 for 7 Central and East European countries, to explore the macroeconomic determinants of NPLs, and find both unemployment and inflation rates to increase the growth of NPLs while real GDP growth has a negative effect. Jakubik and Reininger (2013) examine the determinants of NPLs in 9 Central, Eastern and Southeastern European (CESEE) countries comprising of Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, Russia, Slovakia and Ukraine. Using GMM estimations with quarterly data from 2004 to 2012, the authors find real GDP growth and national stock price index to reduce NPLs while a nation's exchange rate, private credit-to-GDP and past NPLs to increase present period's NPLs.

Moving toward the euro area region, Makri et al. (2014) examine the role of both macroeconomic and bank-specific factors on NPLs in 14 countries in the Eurozone and find a strong influence of both categories of variables on NPLs. Messai and Jouini (2013) examine the issue for 85 banks in Italy, Greece and Spain, respectively, for 2004–2008 and find both economic growth and bank profitability to reduce NPLs while unemployment rates, real interest rates, and poor credit quality to positively influence NPLs.

Surveying some recent individual European country-specific analyses, Louizis et al. (2012) use data for 9 Greek commercial banks and examine NPLs in consumer, business and farm loan categories. The authors find NPLs to be mainly influenced by macroeconomic variables. Salas and Saurina (2002) examine Spanish commercial and savings banks, and find GDP growth to lower NPLs. Macit (2012) investigates NPLs for 15 largest commercial banks in Turkey using quarterly data from 2005 to 2010. Both bank-specific and macroeconomic variables significantly influence NPLs. Similarly, Cifter et al. (2009) find lagged industrial production to influence NPLs in the Turkish banking industry for 2001–2007.⁴

Turning to studies looking at other regions, Beck et al. (2013) examine the role of key macroeconomic indicators in 75 countries (both advanced and emerging economies) for the period 2000–2010, and find real GDP, nominal effective exchange rates, share prices and real lending rates to significantly affect NPLs. Espinoza and Prasad (2010) use a panel dataset from 1995 to 2008 for 80 banks in the Gulf Co-operation Council region and find NPLs to worsen as economic growth lowers and interest rates and risk aversion increase. Likewise, Nkusu (2011) examine the issue for 26 advanced economies for the period 1998–2009 and confirm that adverse macroeconomic determinants are associated with rising NPLs. Buncic and Melecky (2012) estimate determinants of NPLs by using GMM estimations using annual data for 54 high- and middle-income countries from 1994 to 2004. Explanatory variables include the lagged NPL ratio, real GDP growth, CPI inflation, the (ex post) real interest rate and changes in the nominal U.S. dollar exchange rate for each country, while a vector of control variables comprising

³ In a somewhat different but related topic, other earlier studies that have examined issues of loan quality across US states include Gambera (2000), Keeton (1999), Keeton and Morris (1987).

⁴ Other individual country-specific studies in Europe include Nikolaidou and Vogiazas (2014) for Bulgaria; Podpiera and Weill (2008) for banks in Czech Republic; and Quagliariello (2007) for Italy. Studies covering other regions include Misra and Dhal (2010), Dash and Kabra (2010) for India; Zeng (2012) for China; Hu et al. (2004) for Taiwan.

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