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Finance and Accounting for Sustainable Development – Responsibility, Ethic, Financial Stability

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DO LOAN LOSS PROVISIONS ACCOUNTING AND PROCYCLICALITY MATTER FOR THE EFFECTS OF CAPITAL ON LOAN GROWTH OF BIG BANKS IN THE EUROPEAN UNION?

CZY SPECYFIKA ZASTOSOWANIA REZERW NA RYZYKO KREDYTOWE I ICH PROCYKLICZNOŚĆ WPŁYWAJĄ NA ZWIĄZEK MIĘDZY AKTYWNOŚCIĄ KREDYTOWĄ I KAPITAŁAMI DUŻYCH BANKÓW W UNII EUROPEJSKIEJ?

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Summary: The purpose of this study was to identify the impact of loan loss provisions accounting and of procyclicality of loan loss provisions on the association between the loan growth rate and the capital ratio of big banks in the European Union. To estimate this impact, we apply the two-step robust GMM approach of Blundell, Bond [1998]. The empirical analysis shows that the loan growth rate of banks which tend to smooth their earnings and banks which manage their risk more prudently as well as banks which have loan loss provisions less sensitive to a business cycle is less affected by the capital ratio. We do not find support for the view that loan growth of banks which use loan loss provisions for capital management is less affected by the capital ratio. Our results give empirical support for the macroprudential policy tools which aim to introduce forward looking provisioning, e.g. dynamic provisions or expected loss approach.

Keywords: loan growth, capital ratio, loan loss provisions, procyclicality of loan loss provisions.

Streszczenie: Celem artykułu jest określenie wpływu specyfiki zarządzania zyskami przy użyciu rezerw na ryzyko kredytowe oraz procykliczności tych rezerw na związek między stopą wzrostu kredytów i współczynnikiem kapitałowym dużych banków w Unii Europejskiej. Wpływ ten zostanie zbadany przy użyciu dwuetapowego odpornego estymatora GMM Blundella i Bonda [1998]. Analiza empiryczna pokazuje, że w przypadku banków, które w większym zakresie angażują się w wygładzanie dochodów oraz cechują się słabszą wrażliwością rezerw na cykl koniunkturalny, związek między aktywnością kredytową oraz kapitałami jest bardzo słaby. Nie potwierdzono hipotezy, że banki stosujące w większym zakresie zarządzanie kapitałami przy użyciu rezerw są jednocześnie mniej podatne na ograniczenie stopy wzrostu kredytów związane z nieadekwatnym wskaźnikiem kapitałowym. Uzyskane w badaniu wyniki mogą stanowić uzasadnienie dla wdrożenia w Unii Europejskiej instrumentów polityki makroostrożnościowej, które sprowadzają się m.in. do wyprzedzającego tworzenia rezerw na ryzyko kredytowe, np. dynamicznych rezerw albo rezerw służących pokryciu oczekiwanych strat.

Słowa kluczowe: stopa wzrostu kredytów, współczynnik kapitałowy, rezerwy na straty kredytowe, procykliczność rezerw na straty kredytowe.

1. Introduction

The magnitude of the effect of changes in bank capital in the extension of bank credit has been one of the most important questions in the empirical and theoretical literature as well as in practice in the aftermath of the crisis of 2007/8, due to role that banks play in the economy. This paper focuses on the impact of the bank capital ratio on the bank loan growth of large EU banks. We aim to find out whether loan loss accounting and procyclicality of *LLP* matter for the effect of the capital ratio on loan growth during both expansionary periods and contractions.

To test our hypotheses, we apply the two-step GMM robust estimator [Blundell, Bond 1998] for data spanning the years 1996–2011 on individual banks available in the Bankscope database. To obtain measures of individual bank' income smoothing, risk management, capital management and procyclicality of *LLP*, we run an ordinary least squares estimation.

The rest of the paper is organized as follows. Section 2 presents a literature review and hypotheses development. In Section 3 we describe our dataset and methodology. Section 4 presents the results of the empirical analysis. Section 5 presents conclusions.

2. Literature review and hypotheses development

2.1. Effects of the capital ratio on loan growth

Economic theory and empirical evidence suggests a very wide range of possible values of the impact of a change in bank capital on bank's assets (in particular their composition) and consequently its lending. On the one hand, there is a possibility

that a reduction in bank's capital, which results from serious losses, can be absorbed without any change in bank's assets – and thereby in bank's lending – probably due to the high capital buffer (i.e. the capital in excess to the minimum capital ratio) a bank has both before and after losses and because capital decline can be offset by supplementary sources of funding. On the other hand, there is a possibility that banks very actively manage the composition of their assets to keep a stable relationship between capital and assets (i.e. a constant capital-to-assets ratio, henceforth capital ratio), since they have very limited access to external financing, and thus have difficulties in raising equity to offset declines in bank capital.

Despite the importance of the magnitude of the effect of bank capital on bank lending in the 2007 financial crisis, few recent estimates of this effect exist [e.g. Beatty, Liao 2011; Berrospide, Edge 2010; Carlson et al. 2013 for the US banks; Gambacorta, Marquéz-Ibáñez 2011 for the US and EU banks; Mora, Logan 2012 and Bridges et al. 2014 for the UK; and Labonne, Lame 2014 for the French banking market]. In the recent paper Olszak et al. [2014b] focus on the role of income smoothing, procyclicality of loan loss provisions (henceforth *LLP*), regulations and supervision in the effects of the capital ratio on the loan growth of large EU banks. In this paper we extend their analysis by focusing on capital management, risk management as well as by applying a different measure of procyclicality of loan loss provisions.

2.2. LLP accounting and procyclicality

There are several instances of loan loss accounting practices by banks. Generally, the literature identifies two basic examples of such accounting: earnings management and capital management [Koch, Wall 2000; Beatty, Liao 2014]. Earnings management aims at reducing the volatility of banks income, and is extensively analyzed in the empirical literature focused on testing the hypothesis of income smoothing by both industrial firms and banks [Koch, Wall, 2000; Fonseca, Gonzalez 2008]. The basic explanation of income smoothing is banks' preference for a stable level of their allowances for loan losses in order to avoid scrutiny by bank regulators, auditors and market participants.

Another application of loan loss accounting is capital management. The traditional capital management hypothesis states that bank managers use *LLP* to reduce expected regulatory costs associated with violating capital requirements, a negative relationship expected between *LLP* and the capital ratio.

Changes in total loans outstanding or in the loan growth rate are related to changes in credit default risk. An analysis of the sensitivity of *LLP* to loan growth rate is usually applied in the literature to explore the so-called risk management hypothesis [Laeven, Majnoni 2003; Bikker, Metzemakers 2005; Fonseca, González 2008]. According to this literature, banks which provision more when loan growth is stronger should be less prone to macroeconomic conditions.

Procyclicality of *LLP* has been identified in many previous studies. According to Laeven, Majnoni [2003] and Bikker, Metzemakers [2005], banks' accounting practices in the area of *LLP* are procyclical when the relationship between loan loss provision and real GDP growth (*GDPG*) is negative. More recent study by Olszak et al. [2014a] show that procyclicality of *LLP* is reduced in banks which engage in income smoothing, capital management and credit risk management.

2.3. Hypotheses

The literature cited above suggests that banks which engage more in income smoothing and have less procyclical *LLP* are less prone to reduction of lending due to insufficient capital ratios [Olszak et al. 2014b]. We look at two additional hypotheses (H1 and H2 related to *LLP* accounting, i.e. risk management and capital management.

1. H1: **Lending of banks with less prudent credit risk management is more capital constrained than lending of banks with more prudent credit risk management.**

2. H2: **Lending of banks with less capital management is more capital constrained than lending of banks with more capital management.**

We also look at the role of the income smoothing and the procyclicality of *LLP* to get insight into the relative importance of different loan loss accounting practices of banks [e.g. by Olszak et al. 2014b] for the association between the loan growth and the capital ratio.

3. Data description and research methodology

3.4. Data

We use pooled cross-section and time series data of individual banks' balance sheet items as well as profit and loss accounts from 27 EU countries and country-specific macroeconomic indicators for these countries over a period from 1996 to 2011. The balance sheet and profit and loss account data are taken from unconsolidated financials available in the Bankscope database, whereas the macroeconomic data were accessed from the Eurostat and the IMF web pages. We exclude from our sample outlier banks by eliminating the extreme bank-specific observations when a given variable adopts extreme values. Since most of these institutions are located in Ireland, the number of countries included in the final sample drops to 26. Based on this selection strategy, the number of banks included in our sample is 2,523 (27,359 observations and 26 countries).

3.5. Methodology

The empirical models that addressed the question of whether a bank-capital induced credit crunch was hindering the recovery were developed in the early and mid-1990s in the US. We follow contemporary adoptions of those models available in studies analyzed in the previous section. Our basic model applied to test our hypotheses reads as follows:

$$\Delta Loan_{i\,t} = \beta_1 + \beta_2 Contraction + \beta_2 CAP_{i,t} + \beta_3 Contraction * CAP_{i,t} + \beta_4 LIQGAP_{i,t} + \beta_5 DEPBANKS_{i,t} + \beta_6 \Delta CAP_{i,t} + \beta_7 QLP_{i,t} + \beta_8 size + \beta_9 \Delta UNEMPL_{j,t} + \beta_{10} \sum_{j=1}^{27} Country_j + \beta_{11} \sum_{t=1996}^{2011} T_t\, \vartheta_{i,t} + \varepsilon_t \quad (1)$$

where: i – the number of the bank;
j – the number of the country;
t – the number of observation for the i-th bank;
$\Delta Loan$ – the annual loan growth rate (real);
CAP – the capital ratio, i.e. equity capital divided by total assets. We expect a positive sign if loan growth is constrained by the capital ratio;
LIQGAP – the liquidity gap, calculated as (loans to the nonfinancial sector subtract deposits of the nonfinancial sector subtract interbank deposits)/loans to the nonfinancial sector; this variable measures the extent to which bank loans are financed by unstable funding (i.e. securitizations, etc.). Banks which have more stable funding (deposits) relative to loans should be able to extend loans, so we expect a negative sign on *LIQGAP*;
DEPBANKS – deposits from banks divided by total assets. We expect a positive sign if interbank deposits boost liquidity of a bank and make lending easier;
ΔCAP – annual change in the capital ratio. We expect a negative sign on this variable, because to increase its capital ratio a bank must either increase its capital (without changes in risk weighted assets) or decrease risky loans (without a change in capital);
QLP – is quality of lending portfolio; it equals *LLP* divided by average loans (negative coefficient is expected);
size – logarithm of assets. On the one hand, large banks may benefit from the too-big-to-fail position and thus might isolate better adverse shocks (a positive coefficient). On the other hand, in the case of small banks, strong relationships between banks and their borrowers may result in a negative relationship (a negative coefficient);

$\Delta UNEMPL$ – annual change in the unemployment rate. The higher the unemployment rate, the lower the demand for loans is, and thus the loan growth is reduced.

Elements $\sum_{j=1}^{27} Country_j$ *and* $\beta_{11} \sum_{t=1996}^{2011} T_t$ are a set of country and time dummy variables $\alpha\vartheta$ are unobservable bank-specific effects that are not constant over time but vary across banks. Finally, ε is a white-noise error term.

We predict a negative coefficient on contract if loan supply declines during contractions for reasons other than capital and liquidity constraints [like Beatty, Liao 2011, p. 7]. Further, if external financing is not frictionless and banks are concerned that they might violate capital requirements, then the coefficient on *CAP* is expected to be positive. That is banks with a higher capital ratio will extend more loans.

A positive sign on *ContractionxCAP* is expected if banks' loan growth is constrained by capital in contractions, otherwise a negative sign is expected. To identify contractionary periods, we refer to dataset available in the study of Olszak et al. [2014b], which was prepared following the approach of Lenart, Pipień [2013].

As measures of income smoothing (*ISI*), capital management (*CMI*), risk management (*RMI*) and procyclicality (*PROCI*) we apply indices which were worked out by Olszak et al. [2014a]. We define *ISI* as a coefficient from a individual bank's regression of *LLP* on contemporaneous earnings (i.e. operating profits before taxes and provisions) obtained by using an ordinary least squares estimator. High sensitivity of current *LLP* to current period earnings levels is interpreted as greater discretionary smoothing [as in Bushman, Williams 2012]. *CMI* and *RMI* are also coefficients from such a regression, but here we regress *LLP*, respectively, on the capital ratio (to get *CMI*) and the loan growth rate (to obtain *RMI*). The more negative *CMI* to more capital management and the more positive *RMI*, the more prudent risk management. *PROCI* is defined as a coefficient from an individual bank's regression of *LLP* on contemporaneous economic growth *per capita*. The more negative the sensitivity of current *LLP* to economic growth, the more procyclical loan loss provisioning of a given bank is.

In order to limit a possible estimation bias, we apply a system of the generalized method of moments (GMM) proposed by Blundell, Bond [1998]. This method has a proven track record and seems to be the best approach to address three relevant econometric issues, which are inherent to our analysis: 1) the presence of unobserved bank specific effects, which is eliminated by taking first differences of all variables; 2) the inclusion of lags of the dependent variable needed to capture the dynamic nature of loan growth, which brings about the autoregressive nature of the data regarding the behavior of lending; and 3) the likely endogeneity of the explanatory variables, mentioned already.

4. Empirical results

The results of our test examining the effect of loan loss accounting and the procyclicality of *LLP* on lending in large banks are presented in Table 1. The first two columns report the results of the capital ratio effect on loan growth for the "income smoothing more" category versus "income smoothing less" banks. As can be inferred from the table, loan growth of banks engaging less in income smoothing (i.e. low *ISI*) is definitely more dependent on capital ratios, as the regression coefficient between loan growth and *CAP* is positive and statistically significant. As for the role of risk management, we also find that the loan growth rate of banks which do not apply *LLP* to manage risk is capital constrained, because the regression coefficient on *CAP* is significantly positive. This result gives empirical support in favor of our first hypothesis (H1).

As the regression coefficient between loan growth and *CAP* is positive and stronger and statistically significant in the sample of banks which seem to apply *LLP* for the capital management (i.e. more *CMI* banks), we infer that the capital management does not reduce procyclical effects of the capital ratio on loan growth. Thus, we do not find support for our second hypothesis (H2).

The last two columns refer to the impact of procyclicality of *LLP* on the strength of association between loan growth and capital ratios of large banks. We find that the loan growth of banks with more procyclical *LLP* is more affected by capital ratios than the loan growth of banks with less procyclical *LLP*. The impact of the capital ratio is strengthened in contractions. Therefore, our results are in line with the evidence found by Olszak et al. [2014b].

Table 1. Empirical results

Dependent variable: Δloan	[1] High *ISI*		[2] Low *ISI*		[3] High *RMI*		[4] Low *RMI*		[5] Less *CMI*		[6] More *CMI*		[7] Low *PROCI*		[8] High *PROCI*	
		p. val.		*p*. val.		*p*. val.		*p*. val.		*p*. val.		*p*. val.		*p*. val.		*p*. val.
Δ*loan*[-1]	–0.0325	0.17	–0.0062	0.84	–0.0489	0.27	0.0036	0.90	–0.0153	0.63	–0.0186	0.58	–0.0631	0.11	0.0164	0.58
	[–1.38]		[–0.20]		[–1.11]		[0.12]		[–0.49]		[–0.55]		[–1.59]		[0.55]	
Δ*loan*[-2]	–0.2461	**0.00**	–0.1757	**0.00**	–0.2588	**0.00**	–0.2018	**0.00**	–0.1885	**0.00**	–0.2759	**0.00**	–0.2204	**0.00**	–0.2512	**0.00**
	[–5.29]		[–5.16]		[–8.80]		[–5.15]		[–4.66]		[–8.51]		[–4.02]		[–6.68]	
Contraction	–1.8558	**0.11**	0.6353	0.55	–2.3397	**0.03**	0.3805	0.66	–0.5110	0.67	–0.1569	0.85	–0.5892	0.61	–0.9420	0.35
	[–1.61]		[0.60]		[–2.21		[0.44]		[–0.43]		[–0.19]		[–0.52]		[–0.94]	
CAP	0.0047	0.99	0.3482	0.00	0.1863	0.53	0.2408	0.02	0.2315	0.13	0.2975	0.02	0.2109	0.45	0.3704	0.00
	[0.02]		[3.32]		[0.62]		[2.27]		[1.51]		[2.43]		[0.76]		[2.91]	
Contractionx CAP	0.0216	0.92	–0.1467	0.38	–0.0095	0.95	–0.0188	0.88	–0.0126	0.95	–0.1992	0.09	–0.3168	0.08	0.1300	0.42
	[0.10]		[–0.88]		[–0.06]		[–0.15]		[–0.06]		[–1.68]		[–1.78]		[0.81]	
LIQGAP	0.0049	0.51	0.0020	0.70	0.0084	0.46	–0.0032	0.59	0.0041	0.60	0.0051	0.18	0.0114	0.12	–0.0007	0.89
	[0.65]		[0.39]		[0.74]		[–0.53]		[0.53]		[1.35]		[1.57]		[–0.14]	
DEPBANKS	0.0457	0.61	0.0236	0.69	0.0148	0.84	0.0368	0.54	0.0617	0.36	0.0015	0.98	–0.2100	**0.00**	0.2648	**0.00**
	[0.52]		[0.40]		[0.21]		[0.61]		[0.92]		[0.02]		[–2.93]		[3.16]	
Δ*CAP*	–1.0322	0.16	–1.5356	**0.00**	–1.8095	**0.01**	–0.6727	**0.03**	–1.5827	**0.00**	–1.1936	**0.02**	–3.0132	**0.00**	–0.8298	**0.01**
	[–1.41]		[–4.67]		[–2.77]		[–2.14]		[–3.49]		[–2.33]		[–3.39]		[–2.62]	
QLP	1.0708	**0.01**	–0.4858	0.30	2.7886	**0.00**	–1.3771	**0.00**	–0.0610	0.90	0.3611	0.47	0.6845	**0.05**	–0.0944	0.85

	[2.73]		[–1.03]		[6.72]		[–4.58]		[–0.12]		[0.72]		[2.00]		[–0.19]	
size	2.1021	**0.00**	1.0594	**0.00**	3.4720	**0.00**	0.3939	0.16	1.0946	**0.00**	2.1436	**0.00**	1.9727	**0.00**	1.3167	**0.00**
	[2.93]		[3.72]		[3.39]		[1.42]		[3.61]		[3.48]		[4.95]		[3.28]	
Δ*UNEMPL*	3.3095	**0.00**	1.4155	**0.00**	3.5829	**0.00**	1.3538	**0.00**	1.9751	**0.00**	2.6961	**0.00**	4.0938	**0.00**	1.5589	**0.00**
	[8.29]		[3.39]		[16.05]		[3.18]		[4.63]		[5.37]		[12.73]		[3.80]	
Intercept	–28.5068	**0.01**	–14.5645	**0.00**	–50.2927	**0.00**	–3.4396	0.41	–14.8597	**0.00**	–29.6779	**0.00**	–22.1315	**0.00**	–23.3215	**0.00**
	[–2.74]		[–3.23]		[–3.73]		[–0.82]		[–3.03]		[–3.36]		[–4.10]		[–3.65]	
AR1	–5.38	**0.00**	–5.46	**0.00**	–5.70	**0.00**	–5.21	**0.00**	–4.99	**0.00**	–5.70	**0.00**	–5.89	**0.00**	–4.95	**0.00**
AR2	0.78	0.43	0.52	0.61	0.43	0.67	1.03	0.30	0.65	0.52	1.65	**0.10**	0.39	0.70	1.44	0.15
Hansen test/ *p*. val.	209.90	**0.02**	181.64	0.35	206.49	**0.02**	189.38	0.20	196.67	**0.09**	197.36	**0.07**	174.87	0.30	218.14	**0.02**
No. of banks	213		184		211		192		199		199		176		221	
No. of observations	2127		1777		2190		1771		1859		2046		1790		2114	

The model is given by equation (1). The results are obtained for banks included in Largea30 subsample. The symbols have the following meaning: Δ*loan* – annual loan growth rate; *Contraction* – dummy equal to one in contractions and 0 otherwise; *CAP* – capital ratio, i.e. equity capital to total assets; *ContractionxCAP* – interaction between contraction and the capital ratio [*CAP*]Δ*CAP* – annual change in the capital ratio; *DEPBANKS* – deposits from banks to total assets; *LIQGAP* – loans less total customer deposits less deposits from banks divided by loans; *size* – logarithm of total assets; *QLP* – *LLP* divided by average loans; Δ*UNEMPL* – change in the annual unemployment rate. High [Low] *ISI* denotes banks with the *ISI* higher [lower] than the median; *RMI* High [Low] denotes banks with the *RMI* higher than the median; *CMI* Less [More] denotes banks with the *CMI* higher [lower] than the median; Low [High] *PROCI* denotes banks with the *PROCI* higher [lower] than the median. Coefficients for the country and time dummies are not reported. The models have been estimated using the GMM estimator with robust standard errors. The *p*.val. denotes significance levels. *T*-statistics are given in brackets. Data range: 1996–2011.

5. Conclusions

The aim of this paper was to identify the impact of LLP accounting and procyclicality on the association between the loan growth rate and the capital ratio of large EU banks. The empirical analysis conducted with the application of the two-step GMM Blundell and Bond approach shows that the loan growth rate of banks which tend to smooth their earnings and banks which manage their risk more prudently as well as banks which have LLP less sensitive to GDP growth *per capita* is less affected by the capital ratio. In these subsamples of banks, the relationship between the loan growth rate and the capital ratio is weak and statistically insignificant. The opposite result is found for banks which do not smooth income, do not apply capital management and which have more procyclical LLP. We do not find support for the view that loan growth of banks which use LLP for capital management is less affected by the capital ratio.

Our results are important for the current policy debate on the role of macroprudential tools in making the banking (and financial) sector resilient to capital constraints. As we show that income smoothing and risk management with LLP does affect the relationship between the loan growth and the capital ratio of banks, reducing the role of the capital ratio in the subsamples of banks which seem to be more engaged in income smoothing and capital management, we give empirical support for the macroprudential policy tools which aim to introduce forward looking provisioning, e.g. dynamic provisions or expected loss approach.

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