Finance Research Letters 25 (2018) 239–243

Contents lists available at ScienceDirect

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

Loan loss provisions and macroeconomic shocks: Some empirical evidence for italian banks during the crisis

Guglielmo Maria Caporale[a], Matteo Alessi[b], Stefano Di Colli[b], Juan Sergio Lopez[b]

[a] Department of Economics and Finance, Brunel University London, Uxbridge, Middlesex UB8 3PH, UK
[b] Department of Economic Research, Federcasse, Rome, Italy

ARTICLE INFO

JEL classification:
G21
G28

Keywords:
Loan loss provision
Bank lending
Financial system cyclicality

ABSTRACT

This paper uses data from a panel of more than 400 Italian banks for the period 2001–2015 to examine the main determinants of loan loss provision (LLP), which are classified as either discretionary (income smoothing, capital management, signalling) or non-discretionary (related to the business cycle). The possible effects of the double-dip recession of 2008–9 and 2011–15 are also examined. The results suggest that LLP in Italian banks is countercyclical, with non-discretionary components and macroeconomic shocks playing a significant role. Moreover, LLP is less cyclical in the case of local banks, since their loans are more collateralised and their behaviour is more strongly affected by supervisory activity.

1. Introduction

During the last decade, the European economy has experienced one of the deepest recessions of the post–war period. The banking sector was significantly affected by the crisis: bad loans piled up, both reducing revenues and increasing loan loss provisions (LLP), which led to further revenue losses. This has made LLP behaviour a crucial issue to be investigated. In particular, the Italian economy was severely affected by a double-dip recession that was deeper and longer than those experienced by other Eurozone countries and also had a bigger impact on non-performing loans and consequently on LLPs of Italian banks. The presence of over three hundred small local cooperative banks makes the Italian case even more interesting. The main function of LLP is to cover expected losses; however, it can also be an important tool to pursue other objectives, such as stabilising earnings and dividends over the cycle. Most recently several supervisory authorities, including the Bank of Italy, have put pressure on the banking industry to assess accurately the quality of loans and to make adequate provision for the increasing credit risk, even though there is no specific legislation establishing a minimum amount of LLP to be held against nonperforming loans (NPLs).

The existing literature suggests that LLP can be affected by at least three types of factors, i.e. the economic cycle, discretionary and non-discretionary behaviour of bank managers. The-non discretionary component is related to credit risk and its aim is to cover expected future credit losses on loans (Wahlen, 1994; Beaver and Engel, 1996). The possible discretionary components may reflect motives regarding capital management, income smoothing and signalling. According to the capital management hypothesis, less capitalised banks should be less willing to make LLP. More precisely, LLP reduces Tier 1 capital and is deducted from risk-weighted assets when calculating Tier 2 capital. If the increase of Tier 2 capital associated with a higher level of LLPs is larger than the decrease in Tier 1 capital, discretionary behaviour could lead to an increase in regulatory capital without a corresponding reduction in the insolvency risk (regulatory capital arbitrage). As a result, less capitalised banks are expected to be less willing to make LLP. This is normally tested by using the deviation of the Total Capital Ratio from 8% divided by 8% ($CAP_{i,t}$), as in Bouvatier and Lepetit (2008) and Bouvatier et al. (2014), or the simple ratio of total equity to total assets, as in Bikker and Metzemakers (2005) and

E-mail address: guglielmo-maria.caporale@brunel.ac.uk (G.M. Caporale).

https://doi.org/10.1016/j.frl.2017.10.031
Received 22 June 2017; Received in revised form 27 October 2017; Accepted 28 October 2017
Available online 29 November 2017

Table 1
Results from Eq. (1).
Source: Authors'calculations using data from Istat and ABI (Italian Banking Association).

Regressors	Dependent variable: $LLP_{i,.t}$			
	Eq. (1)	Eq. (1)	Eq. (1)	Eq. (1)
Constant	−0.0104***	−0.0105***	−0.0105***	−0.0105***
$LLP_{i,t-1}$	0.0752**	0.0712**	0.0712**	0.0776**
$NPL_{i,t}$	0.2844***	0.2830***	0.2830***	0.2841***
$\Delta NPL_{i,t+1}$	0.0026	0.0021***	0.0021	0.0028
$LOAN_{i,t}$	0.0157***	0.0152***	0.0152***	0.0158***
ΔGDP_t	0.0582***	0.0565***	0.0565***	0.0576***
$CRISIS_t$	0.0009***	0.0015***	0.0015***	0.0009***
ΔGDP_t *$CRISIS_t$	−0.0573***	−0.0553***	−0.0553***	−0.0567***
$IS_{i,t}$	−0.0566**	−0.0133	−0.0681***	−0.0551**
$IS_{i,t}$*$CRISIS_t$	–	-0.0548	–	–
$IS_{i,t}$*$NOCRISIS_t$	–	–	0.0548	–
$CAP_{i,t}$	-0.0001	–	–	–
$SIGN_{i,t}$	–	–	–	0.0001***
Observations	5581	5581	5581	5581
Interacted Dummies	Yes	Yes	Yes	Yes
R^2	0.8517	0.8515	0. 8515	0.8527
#Instruments	87	87	87	55
VCE robust	Yes	Yes	Yes	Yes
AR(2) Test (p-value)	0.5624	0.6404	0.6404	0.4643
Wald test (p-value)	0.0000	0.0000	0.0000	0.0000

Note. The results are from Eq. (1). The dependent variable is the ratio of Loan Loss Provisions on Bad Loans to Total Assets. $NPL_{i,.t}$ is the ratio of Bad Loans to Total Loans. $\Delta NPL_{i,.t+1}$ is the one period ahead first – difference of $NPL_{i,.t}$. $LOAN_{i,.t}$ is the ratio of Total Loans to Total Assets. ΔGDP_t is the annual growth of real GDP. $CRISIS_t$ is a dummy variable that takes value 1 during the periods 2008–2009 and 2011–2015. ΔGDP_t *$CRISIS_t$ is the interactive variable between ΔGDP_t and $CRISIS_t$. $NOCRISIS_t$ is a dummy variable that takes value 1 when $CRISIS_t$ equal to 0. $IS_{i,.t}$ is the ratio of earnings before interest, taxes and loan loss provision to total assets. $IS_{i,.t}$*$CRISIS_t$ is the interactive variable between $IS_{i,t}$ and $CRISIS_t$. $IS_{i,.t}$* $NOCRISIS_t$ the interactive variable between $IS_{i,t}$ and $CRISIS_t$. $CAP_{i,.t}$ is a dummy variable that takes value 1 if the bank has a Tier1 Ratio greater than that for the 75th percentile of the sample distribution and 0 otherwise. $SIGN_{i,.t}$ is the one – year ahead percentage change of $IS_{i,.t}$.
The regression method is the Arellano-Bond two-step estimator. *, ** and *** indicate statistical significance respectively at the 10%, at 5% and at 1% level.

Soedarmono et al. (2012). We use a dummy variable ($CAP_{i,t}$) which is equal to 1 if the bank has a Tier 1 ratio greater than that for the 75th percentile of the distribution of the full sample of banks, 0 otherwise. The income smoothing hypothesis implies that banks should decrease (increase) LLP when earnings are expected to be low (high). This hypothesis is tested using the ratio of earnings before interest, taxes and LLP to total assets ($IS_{i,t}$), as in Anandarajan et al. (2006), Bouvatier and Lepetit (2008), Soerdamono et al. (2012) and Bouvatier et al. (2014). Finally, banks ca use LLP to signal their financial strength (Ahmed et al., 1999; Kanagaretnam et al., 2005). To test this hypothesis, we use the one-year-ahead change of earnings before taxes ($SIGN_{i,t} = IS_{i,t+1} - IS_{i,t}/IS_{i,t}$), an adjusted version of the weighted one considered by Anandarajan et al. (2006), Bouvatier and Lepetit (2008), Soedarmono et al. (2012) and Bouvatier et al. (2014). The sign of the coefficient on earnings could be either positive or negative: if banks use provisions to smooth earnings, the expected sign is positive; however, a negative sign is also possible owing to pro-cyclical effects.

2. The model

The determinants of LLP in Italian banks are analysed following a similar approach to Bouvatier and Lepetit (2008), Soerdamono et al. (2012), Packer and Zhu (2012) and Bouvatier et al. (2014). The model is specified as follows:

$$LLP_{i,t} = \beta_0 + \beta_1 LLP_{i,t-1} + \beta_2 NPL_{i,t} + \beta_3 \Delta NPL_{i,t} + \beta_4 LOAN_{i,t} + \beta_5 IS_{i,t} + \beta_6 CAP_{i,t} + \beta_7 SIGN_{i,t} + \gamma_j BCV_{j,i,t} + \delta_t + \varepsilon_{i,t} \quad (1)$$

where the dependent variable $LLP_{i,t}$ is the ratio of LLP to total assets for bank *i* and year *t*, $NPL_{i,t}$ is the ratio of non-performing loans to total loans, $DNPL_{i,t}$ is calculated as follows: $DNPL_{i,t} = NPL_{i,t+1} - NPL_{i,t}$ (both $NPL_{i,t}$ and $DNPL_{i,t}$ are expected to have a positive effect on LLP, since they are a function of the expected credit risk), $LOAN_{i,t}$ is the ratio of total loans to total assets (also expected to have a positive relationship with LLPs since loan growth is one of the sources of bank credit risk), $IS_{i,t}$ is the ratio of earnings before interest, taxes and LLP to total assets, $CAP_{i,t}$ is a capital management variable, as previously defined, $SIGN_{i,t}$ is the one-year-ahead change of earnings before taxes ($SIGN_{i,t} = (IS_{i,t+1} - IS_{i,t})/IS_{i,t}$), an adjusted version of the weighted one considered by Anandarajan et al. (2006), Bouvatier and Lepetit (2008), Soedarmono et al. (2012) and Bouvatier et al. (2014), $BCV_{i,t}$ are the business cycle variables (ΔGDP_t the annual rate of change of Italian GDP, $CRISIS_t$ a dummy variable for the Italian double dip economic recession, equal to 1 for the years 2008–2009 and 2011–2015 and 0 otherwise). The estimation method is the generalised method of moments (GMM) with regressions in first differences (see Arellano and Bond, 1991). The sample is an annual unbalanced panel of Italian banks'

Table 2
Results from Eq. (2) using $BSIZE_{i,t}$ and $HGUA_{i,t}$.
Source: Authors' calculations using data from by Istat and ABI (Italian Banking Association).

Regressors	Dependent variable: $LLP_{i,.t}$			
	Eq. (2)	Eq. (2)	Eq. (2)	Eq. (2)
Constant	−0.0107***	−0.0106***	−0.0105***	−0.0106***
$LLP_{i,t-1}$	0.0776**	0.0750**	0.0784**	0.0820
$NPL_{i,t}$	0.2836***	0.2843***	0.2838***	0.2826***
$\Delta NPL_{i,t+1}$	0.0019	0.0027	0.0029	0.0030
$LOAN_{i,t}$	0.0159***	0.0159***	0.0158***	0.0158***
ΔGDP_t	0.0576***	0.0579***	0.0581***	0.0569***
$CRISIS_t$	0.0009***	0.0009***	0.0009***	0.0011***
ΔGDP_t *$CRISIS_t$	−0.0567***	−0.0571***	−0.0574***	−0.0562***
$IS_{i,t}$	−0.0540***	−0.0587***	−0.0486***	−0.0423***
$SIGN_{i,t}$	0.0001***	0.0001***	0.0001***	0.0001***
$BSIZE_{i,t}$	0.0003	0.0003	–	–
$BSIZE_{i,t}$* $IS_{i,t}$	0.0014	–	–	–
$BSIZE_{i,t}$* $IS_{i,t}$*$CRISIS_t$	–	-0.0107	–	–
$HGUA_{i,t}$	–	–	0.0001	0.0001
$HGUA_{i,t}$* $IS_{i,t}$	–	–	-0.0320	–
$HGUA_{i,t}$* $IS_{i,t}$*$CRISIS_{i,t}$	–	–	–	−0.0891***
Observations	5580	5580	5580	5580
Interacted Dummies	Yes	Yes	Yes	Yes
R^2	0.8542	0.8536	0.8524	0.8524
#Instruments	89	89	89	89
VCE robust	Yes	Yes	Yes	Yes
AR(2) Test (p-value)	0.5596	0.5534	0.5755	0.5297
Wald test (p-value)	0.0000	0.0000	0.0000	0.0000

Note. The results are from Eq. (2). The dependent variable is the ratio between Loan Loss Provisions on Bad Loans over Total Assets. $NPL_{i,.t}$ is the ratio of Bad Loans to Total Loans. $\Delta NPL_{i,.t+1}$ is the one period ahead first – difference of $NPL_{i,.t}$. $LOAN_{i,.t}$ is the ratio of Total Loans to Total Assets. ΔGDP_t is the annual growth of real GDP. $CRISIS_t$ is a dummy variable that takes the value equal to 1 during the periods 2008–2009 and 2011–2015. ΔGDP_t *$CRISIS_t$ is the interactive variable between ΔGDP_t and $CRISIS_t$. $IS_{i,.t}$ is the ratio of earnings before interest, taxes and loan loss provision to total assets. $CAP_{i,.t}$ is a dummy variable that takes value 1 if the bank has a Tier1 Ratio greater than the level associated to the 75th percentile of the sample distribution and 0 otherwise. $BSIZE_{i,.t}$ is a dummy variable which takes value 1 if the bank has a level of Total Assets greater than the level associated to the 75th percentile of the sample distribution and 0 otherwise. $BSIZE_{i,.t}$* $IS_{i,.t}$ is the interactive variable between $BSIZE_{i,.t}$ and $IS_{i,.t}$. $BSIZE_{i,.t}$* $IS_{i,.t}$*$CRISIS_t$ is the interactive variable between $BSIZE_{i,.t}$, $IS_{i,.t}$ and $CRISIS_t$. $HGUA_{i,.t}$ is a dummy variable that takes value 1 if the bank has the ratio of guaranteed loans to total loans higher than the level associated to the 75th percentile of the sample distribution and 0 otherwise. $HGUA_t$ * $IS_{i,.t}$ is the interactive variable between $HGUA_t$ and $IS_{i,.t}$. $HGUA_{i,.t}$*$IS_{i,.t}$*$CRISIS_t$ is the interactive variable between $HGUA_{i,.t}$, $IS_{i,.t}$ and $CRISIS_t$.
Regression techniques is Arellano Bond two step estimator. *, ** and *** indicate statistically significance respectively at 10%, at 5% and at 1%.

balance sheets and income statements from 2001 to 2015. The data have been obtained from the Italian Banking Association (ABI) balance sheet database and ISTAT. The results are shown in Table 1.

The coefficient on $IS_{i,t}$ is negative and statistically significant, which implies a rejection of the null that Italian banks use discretionary provisions to smooth their income. LLP of Italian banks has a cyclical behaviour. $SIGN_{i,t}$ is positively linked to $LLP_{i,t}$ (significance at 10%) but the estimated coefficient is close to zero (consistenly with Soerdamono et al., 2012 and Bouvatier et al., 2014). The coefficient on $NPL_{i,t}$ is positive as expected, and so is that on the loan to assets ratio.

To test whether banks behave differently during crisis periods, an interactive dummy for the income smoothing hypothesis and the last Italian economic recessions (2008–2009, 2011–2015) is introduced. The estimation results (see Table 1) imply a rejection of the income smoothing hypothesis during the crisis.

Other interactive dummies have then been added to the baseline specification given by Eq. (1) excluding signalling to examine further issues in the LLP behaviour of Italian banks. Eq. (1) is therefore respecified in the following way:

$$\begin{aligned} LLP_{i,t} \;=\; & \beta_0 + \beta_1\, LLP_{i,t-1} + \beta_2\, NPL_{i,t} + \beta_3 \Delta NPL_{i,t} + \beta_4\, LOAN_{i,t} + \beta_5\, IS_{i,t} + \beta_6\, CAP_{i,t} + \beta_7\, SIGN_{i,t} \\ & + \gamma_j\, BCV_{j,i,t} \;+ \vartheta_n\, CON_{n,i,t} + \rho_n\, CON_{n,i,t}{\cdot}IS_{i,t} + \varphi_n\, CON_{n,i,t}{\cdot}IS_{i,t}{\cdot}CRISIS_t + \delta_t + \varepsilon_{i,t} \end{aligned} \tag{2}$$

where $CON_{n,i,t}$ is a set of control variables (where n = 1, …, 5) for the size of banks, the level of guarantees, the coverage ratio and riskiness, and the presence of local banks.

All these effects are tested by using dummy variables, namely: $BSIZE_{i,t}$ (banks with Total Assets greater than that for the 75th percentile of the sample distribution), $HGUA_{i,t}$, (1 if the ratio of guaranteed loans to total loans is greater than that for the 75th percentile of the sample distribution, 0 otherwise), $LCR_{i,t}$ (1 if the coverage ratio is lower than that for the 25th percentile of the sample distribution, 0 otherwise), $HRISK_{i,t}$ (1 if the standard deviation of adjusted Return on Equity computed using 3-year rolling windows is greater than that for the 75th percentile of the sample distribution, 0 otherwise), $LOC_{i,t}$ (1 for local banks, 0 otherwise). All these variables are interacted respectively with $IS_{i,t}$ and $IS_{i,t}$ jointly with $CRISIS_t$. The results in Tables 2 and 3 (for $BSIZE_{i,t}$) provide

Table 3
Results from Eq. (2) using $LCR_{i,t}$ and $HRISK_{i,t}$.
Source: Authors' calculations using data from by Istat and ABI (Italian Banking Association).

Regressors	Dependent variable: $LLP_{i,.t}$			
	Eq. (2)	Eq. (2)	Eq. (2)	Eq. (2)
Constant	−0.0105***	−0.0103***	−0.0109***	−0.0106***
$LLP_{i,t-1}$	0.0705**	0.0651*	−0.0736**	−0.0660
$NPL_{i,t+1}$	0.2835***	0.2840***	0.2831***	0.2834***
$\Delta NPL_{i,t}$	0.0006	0.0006	0.0036	0.0025
$LOAN_{i,t}$	0.0148***	0.0147***	0.0155***	0.0150***
ΔGDP_t	0.0433***	0.0426***	0.0533***	0.0561***
$CRISIS_t$	0.0005*	0.0011**	0.0010***	0.0014***
ΔGDP_t *$CRISIS_t$	−0.0423***	−0.0413**	−0.0514***	−0.0543***
$IS_{i,t}$	0.0011	−0.0176	−0.0154	−0.0019
$SIGN_{i,t}$	0.0001***	0.0001***	0.0001***	0.0001***
$LCR_{i,t}$	0.0012***	0.0005**	–	–
$LCR_{i,t}$* $IS_{i,t}$	−0.0642**	–	–	–
$LCR_{i,t}$* $IS_{i,t}$*$CRISIS_t$	–	-0.0471	–	–
$HRISK_{i,t}$	–	–	0.0009**	0.0004**
$HRISK_{i,t}$* $IS_{i,t}$	–	–	−0.0844**	–
$HRISK_{i,t}$* $IS_{i,t}$*$CRISIS_t$	–	–	–	-0.0829**
Observations	5580	5580	5580	5580
Interacted Dummies	Yes	Yes	Yes	Yes
R^2	0.8500	0.8493	0.8531	0.8511
#Instruments	89	89	89	89
VCE robust	Yes	Yes	Yes	Yes
AR(2) Test (p-value)	0.5812	0.5916	0.7025	0.7270
Wald test (p-value)	0.0000	0.0000	0.0000	0.0000

Note. The results are from Eq. (2). The dependent variable is the ratio between Loan Loss Provisions on Bad Loans over Total Assets. $NPL_{i,.t}$ is the ratio of Bad Loans to Total Loans. $\Delta NPL_{i,.t+1}$ is the one period ahead first – difference of $NPL_{i,.t}$. $LOAN_{i,.t}$ is the ratio of Total Loans to Total Assets. ΔGDP_t is the annual growth of real GDP. $CRISIS_t$ is a dummy variable that takes the value equal to 1 during the periods 2008 – 2009 and 2011- 2015. ΔGDP_t *$CRISIS_t$ is the interactive variable between ΔGDP_t and $CRISIS_t$. $IS_{i,.t}$ is the ratio of earnings before interest, taxes and loan loss provision to total assets. $CAP_{i,.t}$ is a dummy variable that takes value 1 if the bank has a Tier1 Ratio greater than the level associated to the 75th percentile of the sample distribution and 0 otherwise. $LCR_{i,.t}$ is a dummy variable that takes value 1 if the bank has a coverage ratio lower than the level associated to the 75th percentile of the sample distribution and 0 otherwise. $LCR_{i,.t}$ * $IS_{i,.t}$ is the interactive variable between $LCR_{i,.t}$ and $IS_{i,.t}$. LCR_t * $IS_{i,.t}$* $CRISIS_t$ is the interactive variable between LCR_t, $IS_{i,.t}$ and $CRISIS_t$. $CAP_{i,.t}$ is a dummy variable that takes value 1 if the bank has a Tier1 Ratio greater than the level associated to the 75th percentile of the sample distribution and 0 otherwise. $HRISK_{i,t}$ is a dummy variable which takes value of 1 if $RISK_{i,t}$ for the i-th bank is greater than the value associated to the 75th percentile of the sample distribution and 0 otherwise. $HRISK_{i,.t}$ * $IS_{i,.t}$ is the interactive dummy between $HRISK_{i,t}$ and $IS_{i,.t}$. $HRISK_{i,.t}$ * $IS_{i,.t}$* $CRISIS_t$ is the interactive dummy between $HRISK_{i,t}$, $IS_{i,.t}$ and $CRISIS_t$.
Regression techniques is Arellano Bond two step estimator. *, ** and *** indicate statistically significance respectively at 10%, at 5% and at 1%.

evidence that the countercyclical behaviour of LLP is more pronounced for banks with a higher level of guaranteed credit portfolio during the Italian economic recessions and a lower coverage ratio (Fonseca and Gonzalez, 2008; Bouvatier et al. 2014), and for riskier banks.

Finally, we focus on local banks proxied by the Italian Cooperative Credit Banks (CCBs). As pointed out by Di Salvo and Ferri (1994), Ferri and Mattesini (1997) and Cosci and Mattesini (1997), Italian CCBs have three main features: 1) they are typically local banks, closely linked to the local economy, 2) they are generally relatively small banks, 3) being cooperative banks the incentives for their managers significantly differ from those of other banks. The estimated coefficients reported in Table 4 imply less evidence of cyclical behaviour in the case of local banks relative to other banks.

3. Conclusions

This paper examines the determinants of LLP in Italian banks over the period 2001–2015, using balance sheet data. In addition to the most common explanatory variables, we also consider the effects of guaranteed loans, coverage ratios and the level of risk. Moreover, we also provide evidence for local banks.

The findings suggest that the main drivers of LLP in Italian banks are non-discretionary behaviour and cyclical components, whilst the discretionary behaviour of bank managers and expectations about future potential losses do not appear to play a role.

Concerning local banks, their LLP strategy seems to be cyclical, but to a lesser extent than for other banks. A possible reason is the fact that the loans of local banks are generally more collateralised.

Table 4
Results from Eq. (2) using $LOC_{i,t}$.
Source: Authors' calculations using data from by Istat and ABI (Italian Banking Association).

Regressors	Dependent variable: $LLP_{i,.t}$	
	Eq. (2)	Eq. (2)
Constant	−0.0117***	−0.0120***
$LLP_{i,t-1}$	0.0752**	0.0831**
$NPL_{i,t+1}$	0.2837***	0.2838***
$\Delta NPL_{i,t}$	0.0023	0.0013
$LOAN_{i,t}$	0.0159***	0.0160***
ΔGDP_t	0.0576***	0.0578***
$CRISIS_{i,t}$	0.0009***	0.0013***
ΔGDP_t *$CRISIS_t$	−0.0566***	−0.0574***
$IS_{i,t}$	−0.0487**	−0.0389
$SIGN_{i,t}$	0.0001***	0.0001***
$LOCAL_{i,t}$	0.0015	0.0013
$LOCAL_{i,t}$* $IS_{i,t}$	−0.0015	–
$LOCAL_{i,t}$* $IS_{i,t}$*$CRISIS_t$	–	−0.0461*
Observations	5580	5580
Interacted Dummies	Yes	Yes
R^2	0.8430	0.8466
#Instruments	89	89
VCE robust	Yes	Yes
AR(2) Test (p-value)	0.5537	0.5534
Wald test (p-value)	0.0000	0.0000

Note. The results are from Eq. (3). The dependent variable is the ratio between Loan Loss Provisions on Bad Loans over Total Assets. $NPL_{i,.t}$ is the ratio of Bad Loans to Total Loans. $\Delta NPL_{i,.t}$ is the one period ahead first – difference of $NPL_{i,.t}$. $LOAN_{i,.t}$ is the ratio of Total Loans to Total Assets. ΔGDP_t is the annual growth of real GDP. $CRISIS_t$ is a dummy variable that takes the value equal to 1 during the periods 2008–2009 and 2011–2015. ΔGDP_t *$CRISIS_t$ is the interactive variable between ΔGDP_t and $CRISIS_t$. $IS_{i,.t}$ is the ratio of earnings before interest, taxes and loan loss provision to total assets. $CAP_{i,.t}$ is a dummy variable that takes value 1 if the bank has a Tier1 Ratio greater than the level associated to the 75th percentile of the sample distribution and 0 otherwise. $LOCAL_{i,t}$ is a dummy variable which takes value of 1 if the i-th bank is a local bank (i. e. a Cooperative Credit bank) and 0 otherwise. $LOCAL_{i,.t}$ * $IS_{i,.t}$ is the interactive dummy between $LOCAL_{i,.t}$ and $IS_{i,.t}$. $LOCAL_{i,.t}$ * $IS_{i,.t}$* $CRISIS_t$ is the interactive dummy between $LOCAL_{i,.t}$, $IS_{i,.t}$ and $CRISIS_t$.
Regression techniques is Arellano Bond two step estimator. *, ** and *** indicate statistically significance respectively at 10%, at 5% and at 1%.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.frl.2017.10.031.

References

Ahmed, A.S., Takeda, C., Thomas, S., 1999. Bank loan loss provisions: a reexamination of capital management, earnings management and signaling effects. J. Account. Econ. 28, 1–25.
Arellano, M., Bond, S.R., 1991. Some tests of specification for panel data: Monte Carlo evidence on employment equations. Rev. Econ. Stud. 58, 277–297.
Beaver, W.H., Engel, E., 1996. Discretionary behavior with respect to allowances for loan losses and the behavior of security prices. J. Account. Econ. 22, 177–206.
Bouvatier, V., Lepetit, L., 2008. Banks procyclical behavior: does provisioning matter? J. Int. Financ. Markets, Inst. Money 18, 513–526.
Bouvatier, V., Lepetit, L., Strobel, F., 2014. Bank income smoothing, ownership concentration and regulatory environment. J. Bank. Finance 41, 253–270.
Cosci S., Mattesini F. (1997), "Credito e sviluppo nelle province italiane", in "Credito e sviluppo", ed. il Mulino, pp. 89–130.
Di Salvo R., Ferri G. (1994), "Credito Cooperativo, finanziamento alle piccole e medie imprese e sviluppo decentrato: valutazioni teoriche e primi riscontri empirici", *Cooperazione di Credito*, ottobre-dicembre, pp. 309–369.
Ferri, G., Mattesini, F., 1997. Finance, Human Capital and Infrastructure: an empirical investigation on postwar Italian growth. Temi Di Discussione Della Banca d'Italia n. 321. https://ideas.repec.org/p/fth/banita/321.html
Fonseca, A.R., Gonzalez, F., 2008. Cross-conuntry determinants of bank income smoothing by managing loan-loss provisions. J. Bank. Finance 32, 217–228.
Kanagaretnam, K., Lobo, G.J., Yang, D.H., 2005. Determinants of signaling by banks through loan loss provisions. J. Bus. Res. 58, 312–320.
Packer F., Zhu H. (2012) Loan loss provisioning practices of Asian Banks *BIS Working Papers*, No 375.
Soedarmono, W., Tarazi A., Agusman A., Monroe G.S., Gasbarro D. (2012). Loan loss provisions and lending behaviour of banks: Asian evidence during 1992-2009, *working paper* (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2049217).
Wahlen, J., 1994. The nature of information in commercial bank loan loss disclosures. Account. Rev. 69 (3), 455–478.