Income smoothing and procyclicality of loan loss provisions in Central European banks

First draft, please do not quote

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Abstract

This paper analyses income smoothing through loan loss provisions and cyclicality of reserves in a 2005-2010 sample of 198 Central European banks. We find empirical evidence for income smoothing in Central European banks, which displays a discretionary character and may relate to a non-prudential motivation. This is exacerbated by the fact that strong procyclicality of bank loan loss provisions emerges in relation to economic growth. Thus, banks in Central Europe do not take advantage of macroeconomic upheavals to build sufficient reserve cushions and may have to use capital to cover credit losses during economic downturns. This exacerbates the existing procyclicality of capital regulations and may increase the probability of a credit crunch.

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Introduction

The phenomenon of income smoothing in financial institutions has been widely analysed in existing literature, both from a theoretical perspective and through empirical models (see e.g. Lambert 1984, Healy and Wahlen 1999, Bikker and Metzemakers 2005). However, the bulk of research relates to developed countries, comprising Western European and US banks, or international samples with some share of developing countries. In addition, empirical results base on bank data from the pre-2008 period, when macroeconomic environments were relatively stable and banking sectors more predictable. The aim of this paper is to analyse income smoothing in a developing country sample only, with a relatively high level of homogeneity of banking sectors, all based in Central European countries. The study uses recent bank data from the period between 2005 and 2010, encompassing financial crisis years and possible changes in bank policies. The relatively short time span allows to avoid the effects of accounting regulation changes, with IFRS standards valid for the whole period.

The importance of analysing income smoothing in banks has been repetitively mentioned (Laeven and Majnoni 2003, Perez et al. 2008) and re-emerges in the post-crisis environment. The crucial aspects of income smoothing stem from its strong role in reducing or increasing procyclical policies of banks, both towards internal bank profitability and credit cycles as well as versus macroeconomic cycles. In addition, income smoothing performed through loan loss provisions has direct links with the level of capital in banks and the procyclicality of capital requirements. As the debate on optimal capital requirements continues, potential input from income smoothing has to be accounted for.

This paper analyses income smoothing in Central European banks and the procyclicality of loan loss provisions between 2005-2010. The structure of the paper is as follows: Section 2 presents a brief literature review and existing empirical results, Section 3 describes the methodology and desrciptive statistics of bank data used in the paper, in Section 4 we demonstrate the empirical results and Section 5 concludes.

2. Theoretical background of income smoothing

Income smoothing, as a part of a wider earnings management field, is studied both within financial and non-financial institutions. In non-financial companies, the process carries strong negative implications, as earnings are manipulated so that „they do not accurately represent economic earnings at every point in time" (Goel and Thakor 2003, p.151). As a result, earnings management masks the true economic performance of companies (Leuz et al.

2003). Activities of financial institutions differ and many authors claim that some degree of earnings management in the form of income smoothing is in fact recommendable (see e.g. Laeven et al. 2003, Perez et al. 2008, Fonseca and Gonzalez 2008).

Income smoothing in banks is a process that entails taking advantage of high earnings to create a buffer of reserves, which are consumed during cyclical downturns. In such a way profitability is restricted in the boost periods, while losses are softened when times are rough. In consequence, bank income streams are made less volatile over time. Due to banks' specific activities, created reserves are however not random and frequently are related to banks' credit risk management policies. All financial institutions maintain credit portfolios, with a certain share of currently healthy loans that is bound to default. This share may be estimated, basing on historical defaults and market analyses, so that the underlying expected value of the loan book is its nominal value reduced by the assessed bad credit load. Taking this into account, income smoothing may be regarded as a process of forward-looking reserve creation, where banks make reserves not only for the existing, but also for the expected defaults in their portfolios (Laeven and Majnoni 2003). This frequently overlaps with the credit and economic cycle, as most bad loans are granted during economic expansion times, while pressing needs for reserves emerge during downturns. Income smoothing through loan loss provisions made in the boost times is thus frequently referred to as "saving for a rainy day" (Greenawalt and Sinkey 1988). [2] In that respect, it's treated positively and recommended both in the literature and in some supervisory regimes (e.g. Spain).

Income smoothing through loan loss provisions is also strictly related to capital adequacy issues. Annual loan loss provisions diminish bottom line profits and thus affect annual retained earnings, feeding into capital. On the other hand, the stock of loan loss reserves is aimed to cover expected losses in credit portfolios, when these occur. Capital is earmarked as a buffer for the unexpected part of a bank's loss distribution (Kim and Santomero 1993, Laeven and Majnoni 2003). However, during economic downturns, banks usually face severe problems with asset quality and when loan loss reserves are not sufficient, they have to use capital to cover credit losses. In such moments, capital requirements increase in line with lower asset quality, but additional capital is pricy or unavailable for weaker banks

[2] In this paper, loan loss provisions (LLP) is the annual net result of changes in the stock of (specific) loan loss reserves (LLR). LLP are a flow variable from the profit and loss statement, while LLR are the stock variable diminishing the value of gross loans on the balance sheet. Specific loan loss reserves (LLR) are different from general loan loss reserves, which are included in capital and created from net profit after taxation. LLP usually constitute a cost item and reduce the tax base. In the literature LLP are also sometimes related to as charge-offs, write-offs or annual reserves. We apply the above LLP and LLR definitions throughout the paper, for consistency.

(Bikker and Metzemakers 2005). This implies restricting further credit activities, if banks want to remain within regulatory capital adequacy limits. Such a credit crunch negatively impacts the whole economy, restricting financing to the real sector and delaying the potential economic upheaval (e.g. through investments). Within this rationale, many authors indicate that adequate levels of loan loss reserves, created during better times, allow to reduce the procyclicality of minimum capital requirements and avoid a credit crunch (Laeven and Majnoni 2003).

On the other hand, similarly as in companies, more stable income levels affect multiple outcomes in banks, apart from credit risk and capital considerations. Fluctuations of bottom line profits are used on capital markets as an element of risk indicators, based on the Z-score methodology (see e.g. Laeven and Levine 2009, or Lepetit et al. 2008). Smooth income streams result in lower perceived riskiness, directly impacting rating levels, funding costs and share price as such (e.g. Greenawalt and Sinkey 1988). As a result, management- and shareholder related outcomes are strongly affected, as managerial compensation schemes, managerial reputation or even job stability, as well as shareholder returns, significantly depend on restricted fluctuations of net profits. In this context, income smoothing is a desired practice by both shareholders and managers and maximises their utility (Lambert 1984). Due to higher valuations of income-smoothing firms, investors expect these practices and the lack thereof provides a negative signal for the capital market (Goel and Thakor 2003).

The above context becomes especially important when paired with the role of managerial discretion in loan loss reserve decisions. It is assumed that despite existing (and sometimes detailed) regulations on reserve levels, bank managers possess some level of discretion over annual loan loss provisions (e.g. Bikker and Metzemakers 2005). Annual provisions are the sum of a non-discretionary part, stemming from the default assessment of the loan portfolio, and the discretionary part, relating to managerial judgment (see e.g. Beatty et al. 1995, Ahmed et al. 1999). In consequence, the negative aspect of the income smoothing process relates to the discretionary part of the loan loss reserve decision, which bank managers exploit in order to maximise their private benefits, rather than improve bank value. Such a non-prudential motivation of income smoothing is regarded negatively and assumed to diminish the benefits of income smoothing stemming from forward-looking provisioning only.

Empirical results on earnings management differ. Early studies of income smoothing base on the US based bank results from previous economic cycles and are not uniform in conclusions. Greenawalt and Sinkey (1988) confirm income smoothing for US bank data

between 1976-1984, so before the introduction of the Basel I regulations. Collins et al. (1995) find support for income smoothing, on a US bank sample between 1971-1991. In opposition to this, Beatty et al. (1995) find no evidence for earnings management through LLPs, using a sample of 148 US banks between 1985 and 1989.[3] In a similar vein, Ahmed et al. (1999) disconfirms the earnings management hypothesis on a 1986-1995 US sample.

More recent studies basing on later business cycle and bank results, with more international samples, provide vast empirical evidence for the existence of income smoothing. G10 banks are demonstrated to be more engaged in income smoothing and act more anitcyclically than banks in developing non-G10 countries (Cavallo and Majnoni 2002). Income smoothing emerges for profitable, consumer loan oriented banks (Liu and Ryan 2006), 29 OECD countries between 1991-2001 (Bikker and Metzemakers 2005) and for a wide sample of banks from 40 non-US countries between 1995-2002 (Fonseca and Gonzalez 2008). European studies prove income smoothing for Italian banks between 1985-2002 (Quagliariello 2007) and Spanish banks 1986-2002 (Perez et al. 2008). On the other hand, despite income smoothing, banks are demonstrated to act procyclically towards the economic cycle, decreasing reserves in times of high GDP growth and being obliged to increase them when macroeconomic conditions slump, proving that existing loan loss reserves were not sufficient (Laeven and Majnoni 2003).

3. Methodology and bank data

Empirically, income smoothing in financial institutions is analysed according to two main methodologies. The first one relies on studying income distributions of banks across time and around specific benchmarks, such as zero profitability or zero changes in profitability. Probability of certain events, such as e.g. generating small losses and small gains, is assumed to be equal, but this is not mirrored in bank results (Shen and Chih 2005). In consequence, irregularities around benchmark values are viewed as earnings management and may materialise for example in higher frequency of small gains than of small losses, with subsequent accumulation of losses, or benchmark beating behaviour (see e.g. Beatty et al. 2002).

The second, more frequently used method of studying income smoothing in financial institutions is the analysis of loan loss provisions cyclicality. This framework is used in our

[3] However, the authors identify some misspecification errors in their estimation, possibly due to the grouping of banks of different sizes (as there may be fundamental differences across size categories). This may explain the result.

paper. In such a setting, income smoothing is usually understood as a positive relation between loan loss provisions and earnings. An early version of the subsequently amended model was introduced by Greenawalt and Sinkey (1988), where the functional version is expressed as:

$$\text{Provision} = f(\text{Income, External proxy, Control variables}) \tag{3.1}$$

In this form, Provision represents the annual addition to the level of loan loss reserves and the main explanatory variable is the pre-provisioning operating income (Income). Income smoothing emerges if there is a positive, significant relation between provisions and earnings, indicating that in times of high profitability banks increase their provisioning, while decreases in profits result in exploiting the loan loss reserve buffers, created earlier. Specific measures likely to be linked with exogenous loan defaults in the bank's market or geographical area, such as a change in personal income, number of business failures and the nominal value of current liabilities of failed businesses, are captured through External proxy.
Control variables account for bank-specific characteristics, such as bank size, loan to assets ratios, loan write-offs and loan portfolio composition variables.

Basing on this general form, subsequent income smoothing models have varied little from the first simplified function. Extended recent versions of the model may be exemplified by a following general form, used by Fonseca and Gonzalez (2008):

$$LLP_{i,t} = \alpha + \beta_1 Income_{i,t} + \beta_2 NLoans_{i,t} + \beta_3 LLR_{i,t-1} + \beta_6 Capital_{i,t} + \beta_7 GDP + \beta_8 Country + \beta_9 Time + a_i + \varepsilon_{i,t} \tag{3.2.}$$

The standard dependent variable is unchanged, as the level of loan loss provisions in current year (LLP). The main explanatory variable is pre-provisioning operating income (Income), accounting for the main income smoothing effect. In dynamic setups, the equation is extended by lagged LLP levels of up to two periods. Additional aspects of cyclicality of loan loss provisions are analysed through adding loan growth (NLoans), where a positive relation with LLP implies that banks are forward-looking in their reserve making policies in that they increase reserves when loan portfolios are boosted (Laeven and Majnoni 2003).

Loan loss reserves (LLR) control for existing levels or credit risk or earlier provisioning policy, sometimes substituted by non-performing loan ratios (NPL). Fonseca and Gonzalez (2008) presume in fact that NPL reflect underlying credit risk more accurately, but refrain from using them due to scarce data availability. The underlying credit or default risk is

a proxy for the non-discretionary part of the loan loss provision, with the deviations from this representing the managerial, discretionary part. Liu and Ryan (2006) exclude LLR and use a change in the level of non-performing loans as an equivalent of the non-discretionary part of LLP, reflecting the changing degree of loan defaults and prevailing credit risk level.

Bank capital levels (Capital) control for potential capital management through LLP, although Perez et al. (2008) indicate that using capital levels from the previous year eliminates all capital management results. In order to mitigate problems with heteroscedasticity, most authors normalise variables of LLP, Income, NLoans and LLR with assets lagged by one year. Capital is sometimes scaled by risk-weighted assets (as in Fonseca and Gonzalez 2008) or by assets (as in Bikker and Metzemakers 2005).

Country and Time are dummy variables used to control for one or both of these factors. Country dummies are essential to controlling for national regulations, accounting rules and tax considerations, as well as specific, national LLP levels in international bank samples, all of which may seriously affect annual decisions regarding LLP.

The second aspect of LLP cyclicality, apart from their relation to internal bank variables, bases on the link with macroeconomic cycles. As a result, macroeconomic variables (GDP growth or GDP growth per capita, inflation and unemployment) not only control for external environments and exogenous risk factors influencing reserve levels, but the relation between LLP and GDP as such provides information on income smoothing. A negative link to GDP indicates that banks smooth income only in relation to their internal condition and not in the broader economic context. In such a case, economic downturns result in a necessity of creating additional provisions, despite some income smoothing versus bank income. On the other hand, periods of high economic growth are not used to create sufficient buffers "for a rainy day", indicating that income smoothing may in fact be driven also by non-prudential motivations, such as managerial private benefits.

Basing on static versions of Laeven and Majnoni (2003), Fonseca and Gonzalez (2008), Bikker and Metzemakers (2005) and Perez et al. (2008), we use the following model to study income smoothing in our paper:

$$\frac{LLP_{i,t}}{Ass_{i,t-1}} = \alpha + \beta_1\left(\frac{Inc_{i,t}}{Assets_{i,t-1}}\right) + \beta_2\left(\frac{NPL_{i,t}}{Loans_{i,t}}\right) + \beta_3\left(\frac{Loans_{i,t}}{Assets_{i,t}}\right) + \beta_4\left(\frac{Capital_{i,t-1}}{Assets_{i,t-1}}\right) + \beta_5 Size + \beta_6(\Delta GDP) + \beta_8 Inflation + v_i + \varepsilon_{it} \quad (3.3)$$

Equation (3.3) includes all standard variables described above. In addition, v_i are individual bank fixed effects, stable through time and ε_{it} are random errors. In the estimation,

(3.3) is sequentially amended to account for potential additional control variables, including bank internal variables, year dummies, crisis-period dummies, recession dummies and country interaction terms. Three additional robustness checks are presented at the end. All estimations have been performed as fixed effects models for panel data, although the robustness in the random effects specification has also been verified (not shown).

The bank sample originally consisted of 245 banks from twelve Central European countries ("Raw sample", Table 3.1).[4] However, this sample has been restricted, due to data availability, particularly relating to non-performing loans, as well 1% and 99% centile exclusions. The raw sample is used for some calculations, such as some means, value of banking sector assets etc. and this is shown. The sample after exclusions („Final sample") is an unbalanced panel of 198 banks, with varying data availability for different years (see Table 5, Annex). All bank financial data stems from the Bankscope database, while macroeconomic data is from the IMF.

Table 3.1. Bank sample – number of year-bank observations in particular countries

Country	**Raw sample**		**Final sample**	
	Freq.	Percent	Freq.	Percent
BULGARIA	115	7.87	78	9.09
CROATIA	195	13.34	111	12.94
CZECH REPUBLIC	132	9.03	76	8.86
ESTONIA	32	2.19	12	1.4
HUNGARY	150	10.26	42	4.9
LATVIA	113	7.73	75	8.74
LITHUANIA	65	4.45	45	5.24
POLAND	190	13	92	10.72
ROMANIA	141	9.64	69	8.04
SLOVAKIA	90	6.16	59	6.88
SLOVENIA	104	7.11	74	8.62
TURKEY	135	9.23	125	14.57
Total	**1,462**	**100**	**858**	**100**

Notes: Own calculations, based on bank data from Bankscope

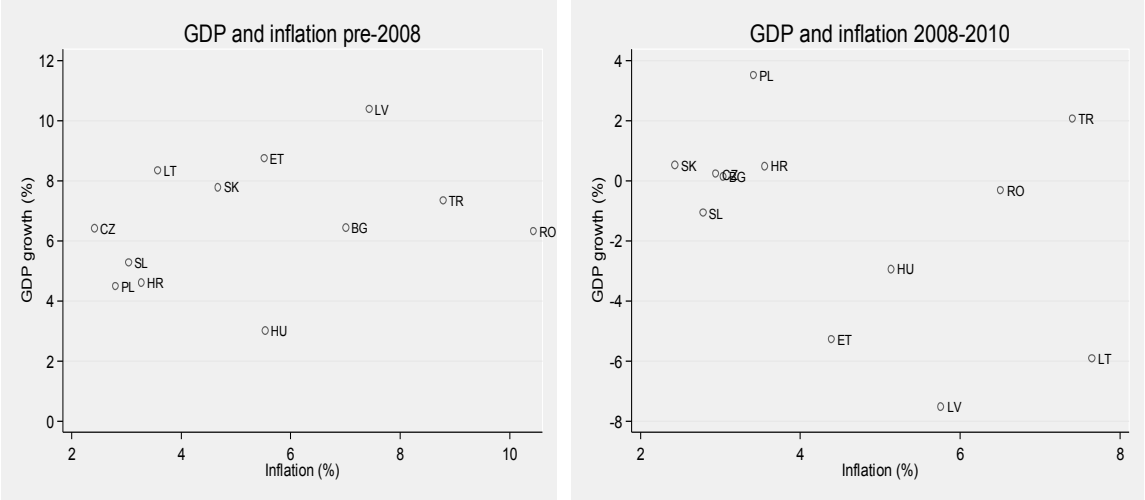
Countries in the sample are not homogenous as to their banking or accounting regulations, supervisory systems and banking system specifications. Below, we shortly summarise some differences between particular systems, especially with regards to size, structure of the balance sheet, credit risk ratios and main income trends. The sample was constructed by choosing available commercial banks from twelve countries, including only living banks and banks that have accessible financial reports from at least end-2008.

Although the number of countries in our sample is not excessively large, important discrepancies between countries have to be considered, both in the macroeconomic

[4] Turkey has been explicitely added to the Central European sample, due to a growing importance of the Turkish banking sector and strong development of banking activities in this region.

environment and the banking system as such, as well as within particular banks. An overview of the macroeconomic conditions is displayed on Graph 3.1., where the effect of the crisis on main macroeconomic indicators is seen, through a comparison of pre-crisis and post-2007 time period.

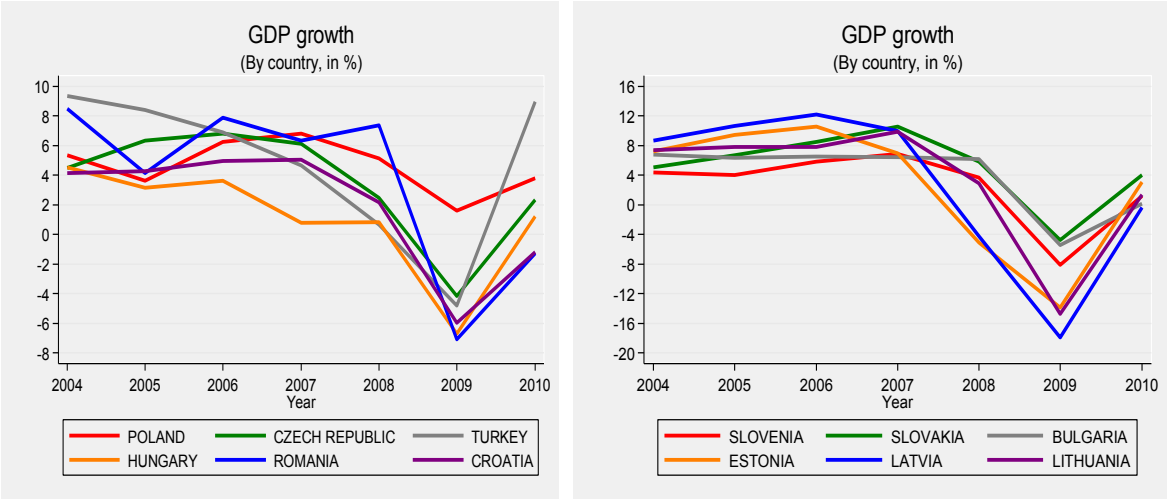
Graph. 3.1. GDP Growth and inflation before and after 2007



Source: Own calculations, based on IMF macroeconomic data.

The rough representation of the macroeconomic conditions demonstrates that most Central European countries have been hit by financial crisis repercussions, however some more than others. Five countries have dropped into negative GDP growth levels and the rest have only marginally kept their heads above the water. The two outliers are Turkey and Poland, with Polish average pre-crisis and post-2007 GDP remaining relatively stable. A more detailed development of GDP growth levels for chosen countries is shown in Graph 3.2.

Graph 3.2. GDP growth by country, 2004-2010.

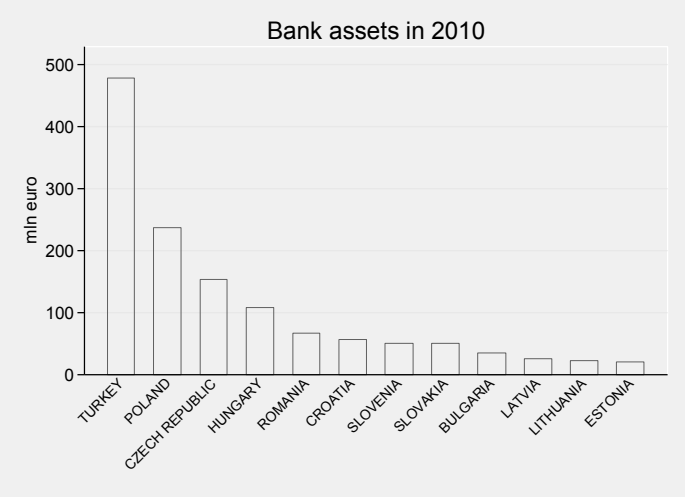


Source: Own calculations, based on IMF macroeconomic data.

Graph 3.2. provides evidence for a severe hit on economic growth experienced by all countries in the sample, with the outlying Poland managing to avoid a full recession in 2009. The two groups of countries have been formed basing on the size of their banking sectors and the smaller banking sector group has experienced visibly higher fluctuations of GDP throughout the studied period. On the other hand, all countries have witnessed a strong rebound in GDP in 2010, indicating that although the time period of our sample is relatively short, it includes growth periods, a deep recession and an economic upheaval.

Although the historical and regulatory reasons contribute to a relatively high homogeneity of the banking systems in Central Europe (apart from Turkey), the diversity of countries in terms of the banking sector size remains (Graph 3.3.)

Graph. 3.3.: Bank assets by country in 2010[5]

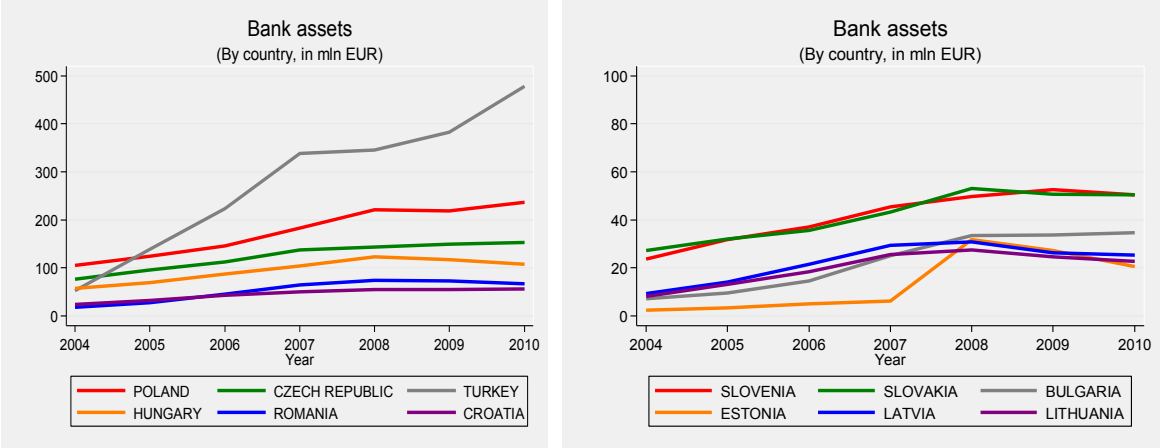


Source: Own calculations, based on bank data from Bankscope

Total assets of banks in our sample at end-2010 vary significantly across countries. Turkey is by far the largest banking sector, with 478 mln EUR assets of banks included in the sample. This represents over 200% of banking assets of the next country, Poland, with 237 mln EUR. These vast differences in size have emerged during the past 6-7 years, as at end-2004 Poland was still by far the largest banking system in the region (Graph 3.4.).

Graph.3.4. Bank assets growth by country, 2005-2010.

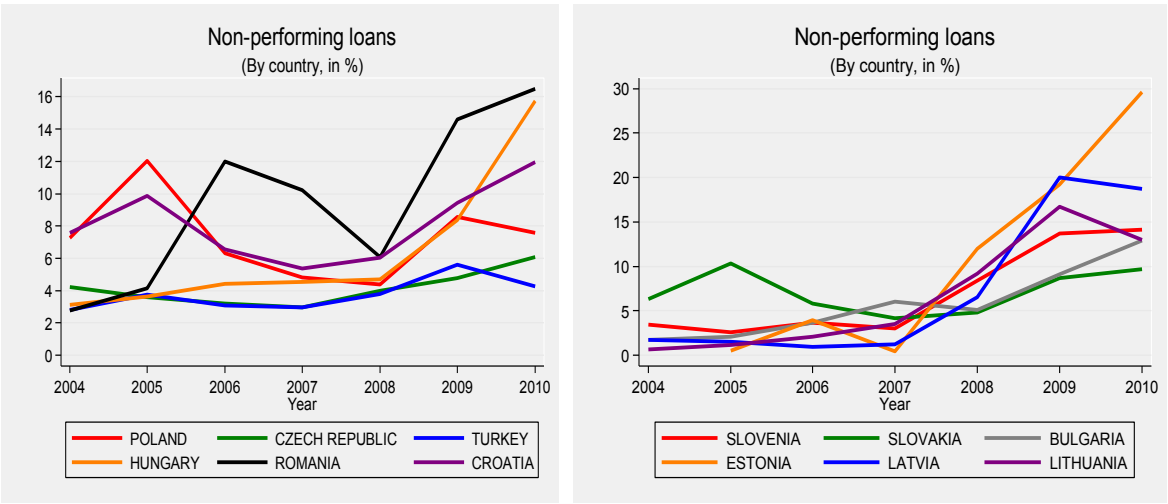
[5] Bank assets are the sum of total assets of banks included in the raw sample, specified above, and not the total banking system size.



Source: Own calculations, based on bank data from Bankscope

The quality of bank assets and created reserves have also varied significantly across studied systems (Graph 3.5.). Apart from Polish and Croatian banks, levels of non-performing loans in most Central European institutions were relatively low at below 5% at the beginning of our sample period, at least for developing country standards. Most countries witness a visible deterioration in asset quality during 2008, with a peak of irregular loans in 2008. The three largest banking systems generally fared better with the troubled credit load, but genereally there is quite strong volatility during a relatively short time period for all banking systems. Nonetheless, such a sketchy comparison should be completed by an analysis of national classification regulations and practices, to ascertain that similar criteria as to irregular loans apply in all markets and that no important changes in these classifications took place during the sample period.

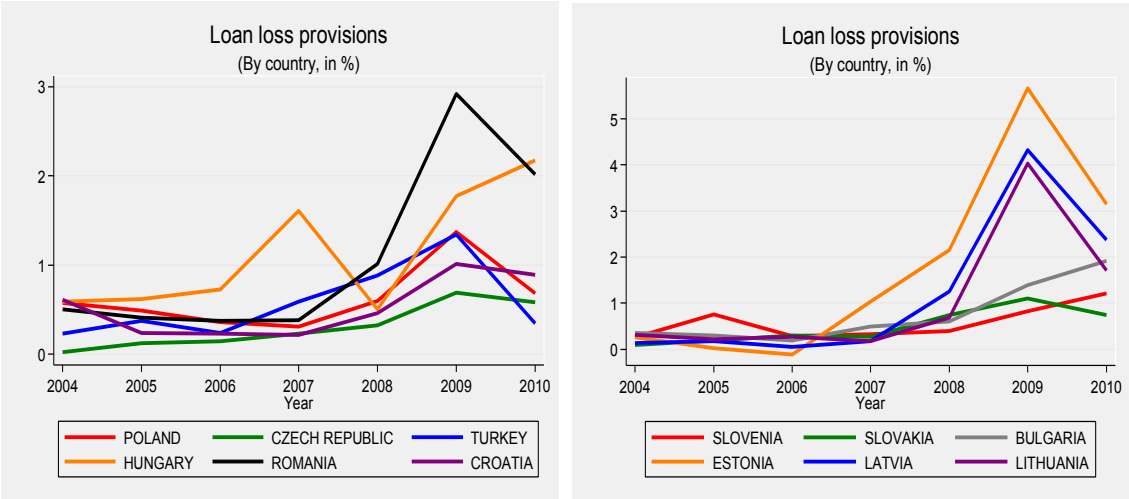
Graph. 3.5. Loan portfolio quality by country, 2004-2010



Source: Own calculations, based on bank data from Bankscope

In parallel to increasing levels of non-performing loans in 2008 and 2009, Central European banks had to make additional provisions (Graph 3.6.). Again, the three largest banking sectors were least hit by additional reserves, while their smaller counterparts had to face substantial additional reserves.

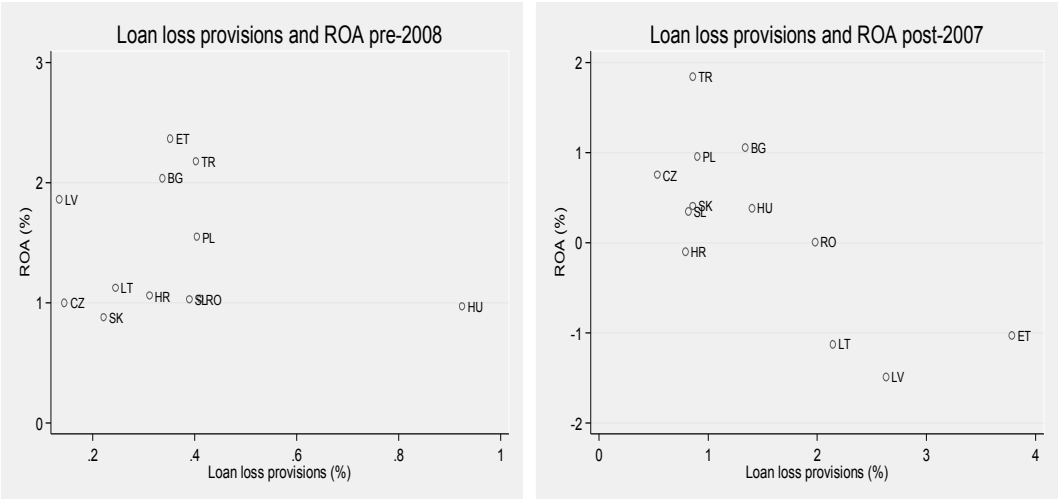
Graph 3.6. Annual loan loss provisions by country, 2004-2010



Source: Own calculations, based on bank data from Bankscope

The worsening quality of the loan portfolio and additional provisions required to cover it severely undermined profits of some banks, leading to lower profitability in the post-2007 era (Graph 3.7.).

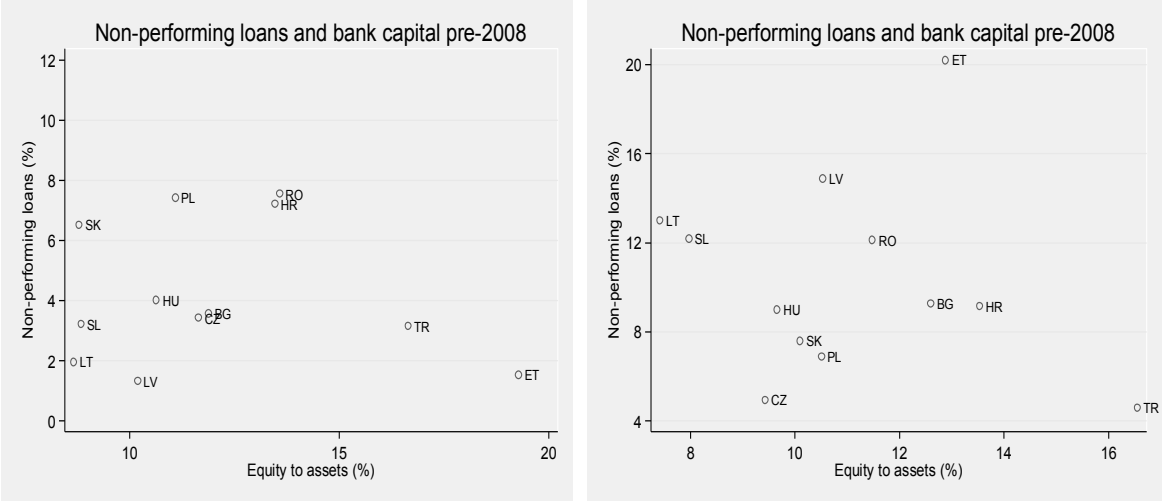
Graph 3.7. Loan loss provisions and profitability in the pre-2008 and 2008-2010 period.



Source: Own calculations, based on bank data from Bankscope

The visible burden of additional loan loss reserves in the post-2008 period significantly affected bottomline profitability of Central European banks. Losses of the smaller banking sectors were coupled with their exploding reserve levels, while more modest reserve making in other countries allowed to maintain high profitability. Thus, an argument for income smoothing potentially emerges here, as banks with smaller reserve needs are able to withstand crisis times with healthier – although still depressed – net results. Year-end losses for many banks directly translate into decreased levels of capital, through retained earnings. As a result, the financial crisis in Central European banks has meant a shift into higher credit risk (NPL) and lower coverage of further unexpected loan defaults (capital), which is visible in Graph 3.8..

Graph 3.8. Non-performing loans and bank equity levels pre- and post 2007.



Source: Own calculations, based on bank data from Bankscope

The pre-2008 and 2008-2010 comparison shows important shifts on Central European banks‘ risk versus capital map. During the financial crisis, the relatively high pre-2008 capital cushions were reduced, while NPL levels peaked. On the other hand, in 2010 quite a few banking systems maintain sound equity levels[6], assuming no forthcoming severe asset deterioration. High profitability of banks in Turkey, Poland, or the Czech Republic strengthen their capital bases, while low exposure to the troubled Western European bonds at these banks predicts well for their future capital prospects.

[6] The capital level in our paper is measured by the - imperfect - equity to assets ratio. This is caused by limited data availability on Tier 1 or total capital adeqauacy in Bankscope, both of which would provide much better capital level information.

The above brief descriptive statistics reveals that the relatively short time span of 2004-2010 included both eonomic prosperity times and a recession in most Central European banking sectors. As a result, banks during that period had a chance to exploit both healthy earnings and GDP levels, and use them in recession times to soften the blow on their bottomline results. On the other hand, strong diversity in bank results and crisis impact reveals that bank reactions to high profitability may also diverge and depend on national trends. The next Section demonstrates results of the empirical estimation of the main income smoothing model, and some additional specifications.

4. Empirical results

The empirical model (3.3.) was estimated using the final sample, defined in Section 3. The main variables are shortly presented in Table 4.1.

Table 4.1. Means and standard deviations of main variables

Variable	Obs	Mean	Std. Dev.
LLP/Ass.	858	0.948	1.39665
INCOME/Ass	858	2.240	1.806588
NPL/loans	858	7.375	9.169384
Equity/Assets	858	10.687	6.111395
Loan growth	858	22.939	35.96032
LLR/loans	858	4.347	3.603312
GDP	858	3.308	5.91159
Inflation	858	4.843	3.320652
Unemplyment	858	9.431	3.640373

The estimation results of Equation (3.3.) are presented in Table 4.2. The results confirm income smoothing in Central European banks in the period 2005-2010, with a significant positive relation between pre-provisioning income and loan loss provisions, robust in different specifications. Specification 1 is the accurate reflection of Equation (3.3.) and indicates that Central European banks increase provisions when income is rising, at a given level of non-performing loans. The captured income smoothing effect possibly relates to the discretionary elements of reserve making, as the default probability within the loan portfolio is controlled for, through irregular loan levels (NPL) and additionally by the share of assets in total loans.

Table 4.2. Estimation results of (3.3.) with additional specifications

	Specification 1			Specification 2			Specification 3		
Dependent var: LLP/As									
	Coeff.	Stand. Error	Signif.	Coeff.	Stand. Error	Signif.	Coeff.	Stand. Error	Signif.
INCOME^	0.15451	0.03575	***	0.16084	0.03659	***	0.14553	0.03532	***
NPL	0.05706	0.00655	***	0.05637	0.00660	***	0.07089	0.00699	***
Lgr				-0.00100	0.00123				
LLR at t-1							-0.09114	0.01614	***
Loans/Assets	0.00363	0.00496		0.00372	0.00496		-0.00406	0.00510	
Equity	-0.01249	0.01261		-0.01066	0.01281		0.00228	0.01268	
Size^^	0.01452	0.01346		0.01394	0.01349		0.00971	0.01329	
GDP^^^	-0.07875	0.00658	***	-0.07640	0.00718	***	-0.07163	0.00666	***
Inflation^^^	-0.01990	0.01343		-0.01977	0.01343		-0.03265	0.01349	**
Constant	0.28346	0.34555		0.26935	0.34607		0.94909	0.36824	**
Within R2		0.3996			0.4002			0.4291	
No. Of obs.		858			858			841	
No. Of banks		198			198			197	

Notes: ^Pre-provisions Income in year t, total assets in year t-1; ^^Total Assets are scaled downwards by 1mln, to achieve coherent coefficient sizes, so the final input is Total Assets/1.000.000; ^^^all macroeconomic indicators are IMF data; *, ** and *** note significance levels of respectively 10%, 5% and 1%.

This potentially anticyclical policy of Central European banks is however countered by a strong procyclical relation between provisions and GDP growth. A robust, negative link between GDP and provisioning levels indicates that although some discretionary income smoothing occurs, reserves have to increase when the general economy is hit. This result is in line with numerous examples from the literature (see e.g. Bikker and Metzemakers 2005 or Laeven and Majnoni 2003) and proves that banks in Cetral Europe have not created sufficient reserves in the upper phases of the economic cycle. In addition, this may indicate that the identified income smoothing does not have to be driven by a prudential motivation, but by a managerial drive to exploit private benefits from decreased bottomline fluctuations. The stable, positive link between non-performing loans and provisions is expected and demonstrates the non-discretionary part of the reserve making (although Bikker and Metzemakers 2005 demonstrate that this relation may also prove insignificant, as e.g. for the US banks).

No evidence as to anticyclicality of provisions towards bank loan growth is visible in Specification 2, as the relation between LLP and Lgr is insignificant. Central European banks do not create provisions simultanously with rapid loan growth, so dynamic expansion phases may result in additional provisions in the future, when loan losses materialise. On the other hand, Western European banks have been demonstrated to decrease provisions in times of rapid growth (Laeven and Majnoni 2003), so the Central European result is in some way positive. Specification 3 provides further evidence for the stability of the income smoothing phenomenon, as well as for the procyclicality of provisions towards GDP, controlling for past level of loan loss reserves. Stock of reserves from a previous year is negatively related to

contemporary loan loss provisions, implying that banks with high levels of reserves decrease their flow of provisioning levels.

In order to investigate the potential effect of the financial crisis on levels of loan loss provisions and to verify income smoothing practises in this time period, Equation (3.3.) was broadened by time effects and crisis variables. The amended equation is presented below.

$$\frac{LLP_{i,t}}{Ass_{i,t-1}} = \alpha + \beta_1\left(\frac{Inc_{i,t}}{Assets_{i,t-1}}\right) + \beta_2\left(\frac{NPL_{i,t}}{Loans_{i,t}}\right) + \beta_3\left(\frac{Loans_{i,t}}{Assets_{i,t}}\right) + \beta_4\left(\frac{Capital_{i,t-1}}{Assets_{i,t-1}}\right) + \beta_5 Size + \beta_5 Crisis$$

$$+ \beta_5 Crisis * Income + \beta_6(\Delta GDP) + \beta_8 Inflation + \beta_9 \sum_{t=2004}^{2010} T_t + v_i + \varepsilon_{it} \qquad (3.4.)$$

The years of the crisis were presumed to be 2008, 2009 and 2010 and these were included both as simple dummy variables (Crisis in Specification 1), as well as an interaction term with pre-provisioning income (Crisis smoothing in Specification 2). The first variable demonstrates an effect of the crisis on the level of provisions, while the second verifies if banks during the financial crisis were engaged in intensified income smoothing. Specification 3 accounts for time effects. Results of estimating Equation 3.4. are presented in Table 4.3.

Table 4.3.: The effect of the financial crisis on loan loss provisions and income smoothing

Dependent var: LLP/As	**Specification 1**			**Specification 2**			**Specification 3**			**Specification 4**		
	Coeff.	Std. Error	Signif.	Coeff.	Std. Error	Signif.	Coeff.	Std. Error	Signif.	Coeff.	Std. Error	Signif.
INCOME^	0.16749	0.03676	***	0.15354	0.03612	***	0.17893	0.03895	***	0.17581	0.03758	***
NPL	0.05458	0.00675	***	0.05680	0.00669	***	0.05495	0.00676	***	0.05290	0.00702	***
2005										-0.09584	0.15989	
2006										-0.00849	0.16100	
2007										0.05802	0.16446	
2008										0.20324	0.18408	
2009										-0.10173	0.23605	
2010										0.11369	0.19740	
Crisis	0.15528	0.10401					0.22566	0.13071	*			
Crisis smoothing				0.00716	0.03661		-0.04084	0.04593				
Loans/Assets	0.00081	0.00530		0.00338	0.00512		0.00095	0.00530		-0.00041	0.00569	
Equity	-0.01386	0.01263		-0.01238	0.01263		-0.01507	0.01271		-0.01435	0.01281	
Size^^	0.00711	0.01434		0.01357	0.01431		0.00915	0.01452		0.00819	0.01535	
GDP^^^	-0.07275	0.00770	***	-0.07810	0.00739	***	-0.07377	0.00779	***	-0.08735	0.01160	***
Inflation^^^	-0.02523	0.01388	*	-0.02047	0.01375		-0.02440	0.01391	*	-0.03940	0.01852	**
Constant	0.42718	0.35840		0.30061	0.35673		0.39458	0.36033		0.64792	0.38032	*
Within R2		0.4017			0.3997			0.4024			0.4060	
No. Of obs.		858			858			858			858	
No. Of banks		198			198			198			198	

Notes: ^Pre-provisions Income in year t, total assets in year t-1; ^^Total Assets are scaled downwards by 1mln, to achieve coherent coefficient sizes, so the final input is Total Assets/1.000.000; ^^^all macroeconomic indicators are IMF data; *, ** and *** note significance levels of respectively 10%, 5% and 1%.

Income smoothing has remained relatively unchanged throughout the studied period and during the financial crisis. The addition of either year effects or consolidated crisis-year

effects has not affected loan loss provisioning levels. A weak positive link between the levles of provisions and the financial crisis time dummy is found in Specification 3, however it is not very stable. The addition of year dummies in Specification 4 proves that none of the studied years emerges as significant, possibly also due to including macroeconomic variables such as GDP and inflation, which partly control for time effects.

On the other hand, time or year dummies may not be sufficient to control for the crisis effects, especially that difficult macroeconomic conditions have occured in some Central European countries outside the 2008-2010 period (Graph 3.2.), while in others the financial crisis time span has not materialised in the form of extremely low GDP growth (Graph 3.2.). In addition, the procyclicality of provisions towards the macroeconomic cycle is one of the crucial findings in our results and we investigate this further by adding dummy variables for recessions in the form of low GDP levels, in line with Bikker and Metzemakers (2005). This constitutes an additional anticyclicality test of provisions versus macroeconomic conditions, regardless of the financial crisis time span. The modified Equation 3.5. is presented below.

$$\frac{LLP_{i,t}}{Ass_{i,t-1}} = \alpha + \beta_1\left(\frac{Inc_{i,t}}{Assets_{i,t-1}}\right) + \beta_2\left(\frac{NPL_{i,t}}{Loans_{i,t}}\right) + \beta_3\left(\frac{Loans_{i,t}}{Assets_{i,t}}\right) + \beta_4\left(\frac{Capital_{i,t-1}}{Assets_{i,t-1}}\right) + \beta_5 Size + \beta_6 Recession + \beta_6(\Delta GDP) + \beta_8 Inflation + v_i + \varepsilon_{it} \quad (3.5.)$$

In 3.5., variable Recession is a dummy variable defined in two possible ways. The first relates to a below average GDP growth (GDP below average), which has been calculated across years and countries for the whole sample period and amounts to a relatively high level of 3.3%. The second relates to very low GDP levels and has been set at maximum 2% (GDP below 2%)[7], showing thus countries in sever threat or at borderline of recession, considering developping country standards. Results of estimating Equation 3.5. are presented in Table 4.4.

Adding controls for low and extremely low GDP levels provides evidence for recessions being special cases in income smoothing. Although introducing an interaction term of Low GDP*Income does not yield a significant relation with LLP (not shown), low GDP growth rates are important for the volume of current LLP. Upon reaching low GDP levels, loan loss provisions decrease, possibly in order to soften the blow of the recession on the already depressed level of bank earnings. This effect is marginally significant for below average GDP, but increases both in strength and significance once GDP growth falls below 2%. The relatively short time span and high diversity of our sample do not allow to draw

[7] Bikker and Metzemakers assume a level of 3%

overly far-reaching conclusions on this result, but it proves that recessions should be treated as a special case and controlled for in further studies with longer data streams.

Table 4.4. Effects of recessions on loan loss provisioning levels

Dependent var: LLP/As	**Specification 1**			**Specification 2**		
	Coeff.	**Std. Error**	**Signif.**	**Coeff.**	**Std. Error**	**Signif.**
INCOME ^	0.14618	0.03605	***	0.14635	0.03582	***
NPL	0.05881	0.00662	***	0.05845	0.00656	***
GDP below av.	-0.18268	0.10985	*			
GDP below 2%				-0.26515	0.11633	**
Loans/Assets	0.00497	0.00502		0.00507	0.00498	
Equity	-0.01192	0.01260		-0.01115	0.01259	
Size ^^	0.01656	0.01350		0.01676	0.01346	
GDP ^^^	-0.08897	0.00899	***	-0.09408	0.00939	***
Inflation ^^^	-0.01785	0.01346		-0.02404	0.01350	*
Constant	0.28348	0.34509		0.32963	0.34504	
Within R2		0.4022			0.4044	
No. Of obs.		858			858	
No. Of banks		198			198	

Notes: ^Pre-provisions Income in year t, total assets in year t-1; ^^Total Assets are scaled downwards by 1mln, to achieve coherent coefficient sizes, so the final input is Total Assets/1.000.000; ^^^all macroeconomic indicators are IMF data; *, ** and *** note significance levels of respectively 10%, 5% and 1%.

Due to including bank fixed effects in the main equation, the influence of possible country-specific conditions, such as particular regulatory and accounting systems, or local standards as to setting loan loss reserves, have been largely eliminated. In addition, the sample size and number of observations per country is not sufficient to perform robust estimations of separate country samples. Nevertheless, equation 3.3. has been modified to verify if income smoothing practices were different in the largest banking systems of the region, i.e. in Turkey, Poland and the Czech Republic. The modified equation is presented below.

$$\frac{LLP_{i,t}}{Ass_{i,t-1}} = \alpha + \beta_1\left(\frac{Inc_{i,t}}{Assets_{i,t-1}}\right) + \beta_2\left(\frac{NPL_{i,t}}{Loans_{i,t}}\right) + \beta_3\left(\frac{Loans_{i,t}}{Assets_{i,t}}\right) + \beta_4\left(\frac{Capital_{i,t-1}}{Assets_{i,t-1}}\right) + \beta_5 Size + \beta_6 Country\ smoothing + \beta_6(\Delta GDP) + \beta_8 Inflation + v_i + \varepsilon_{it} \quad (3.6.)$$

In Equation 3.6., the additional variable Country smoothing is an interaction term, constructed from the country dummy variable and pre-provisioning income (scaled by lagged assets). Results of estimating this equation on the whole sample are shown in Table 4.5.

Table 4.5.: Income smoothing in chosen countries

	Specification 1			Specification 2			Specification 3		
Dependent var: LLP/As									
	Coeff.	**Std. Error**	**Signif.**	**Coeff.**	**Std. Error**	**Signif.**	**Coeff.**	**Std. Error**	**Signif.**
INCOME^	0.15442	0.04251	***	0.16210	0.03649	***	0.15768	0.03648	***
NPL	0.05706	0.00657	***	0.05732	0.00655	***	0.05706	0.00655	***
Turkey smoothing	0.00029	0.07884							
Poland smoothing				-0.17478	0.16896				
Czech smoothing							-0.09477	0.21292	
Loans/Assets	0.00363	0.00496		0.00406	0.00497		0.00386	0.00499	
Equity	-0.01250	0.01285		-0.01158	0.01264		-0.01334	0.01277	
Size^^	0.01452	0.01348		0.01434	0.01346		0.01470	0.01348	
GDP^^^	-0.07875	0.00661	***	-0.07862	0.00658	***	-0.07870	0.00658	***
Inflation^^^	-0.01989	0.01348		-0.02022	0.01343		-0.02060	0.01353	
Constant	0.28358	0.34720		0.27279	0.34569		0.28821	0.34593	
Within R2		0.3996			0.4006			0.3998	
No. Of obs.		858			858			858	
No. Of banks		198			198			198	

Notes: ^Pre-provisions Income in year t, total assets in year t-1; ^^Total Assets are scaled downwards by 1mln, to achieve coherent coefficient sizes, so the final input is Total Assets/1.000.000; ^^^all macroeconomic indicators are IMF data; *, ** and *** note significance levels of respectively 10%, 5% and 1%.

Our main income smoothing and procyclicality results remain unchanged after adding country controls. The income smoothing process in the three chosen countries does not prove significant, which indicates that it is possibly a bank-determined phenomenon rather than a country-specific event. On the other hand, the country samples are relatively small so these results should be treated as an indication of a trend rather than ultimate proof for lack of national specific approaches.

Robustness tests

A few robustness checks have been carried out on Equation 3.3., in order to check for the stability of results and potential effects of ommitted variables. The first test relates to additionally controlling for unemployment (Specification 1), as some authors use this within the macroecnomic variables set. The second test broadens Equation 3.3. by a lagged share of loans in assets (see e.g. Bikker and Meztemakers 2005). The third test was constructed along a similar rationale to Perez et al. (2008) and checks if income smoothing is stronger in banks, which experienced a high deviation of the ROE in comparison to a national sector average (Specification 3).

All robustness checks confirm stability of earlier results, with persisting income smoothing and procyclicality of provisions versus the macroeconomic cycle. Unemployment proves insignificant and demostrates that GDP and inflation constitute sufficient macroeconomic controls. On the other hand, the lagged share of loans in total assets demonstrates a positive link with provisions, as more credit-intense banks have to create higher reserves in future periods.

Table 4.6. Robustness checks results

	Specification 1			Specification 2			Specification 3		
Dependent var: LLP/As	**Coeff.**	**Std. Error**	**Signif.**	**Coeff.**	**Std. Error**	**Signif.**	**Coeff.**	**Std. Error**	**Signif.**
INCOME^	0.15733	0.03590	***	0.15739	0.03570	***	0.17325	0.04033	***
NPL	0.05552	0.00678	***	0.05697	0.00653	***	0.05707	0.00655	***
High ROE dev.							-0.02925	0.02913	
Loans/Ass lag1				0.01022	0.00517	**			
Loans/Assets	0.00526	0.00529		-0.00181	0.00566		0.00381	0.00496	
Equity	-0.01352	0.01267		-0.01531	0.01267		-0.01270	0.01261	
Size^^	0.01521	0.01349		0.00932	0.01369		0.01478	0.01347	
GDP^^^	-0.07730	0.00678	***	-0.07564	0.00675	***	-0.07880	0.00658	***
Inflation^^^	-0.01299	0.01553		-0.01764	0.01344		-0.01998	0.01343	
Unemployment	0.01530	0.01730							
Constant	0.01526	0.45976		0.04689	0.36497		0.27244	0.34573	
Within R2		0.4004			0.4032			0.4006	
No. Of obs.		858			858			858	
No. Of banks		198			198			198	

Notes: ^Pre-provisions Income in year t, total assets in year t-1; ^^Total Assets are scaled downwards by 1mln, to achieve coherent coefficient sizes, so the final input is Total Assets/1.000.000; ^^^all macroeconomic indicators are IMF data; *, ** and *** note significance levels of respectively 10%, 5% and 1%.

The third robustness test stems from a rationale put forward by Perez et al. (2008). They stipulate that income smoothing in banks may be different for periods of higher and lower profitability, relative to a long-term benchmark (defined here as the mean profit before provisions for the available years). They use the absolute value of a deviation from the long-term benchmark as a control variable, which emerges positive but significant only at 14% level. In consequence, they stipulate that a possible trend of increasing income smoothing in times of expansion could exist, even though the use of the absolute value indicates that in fact all positive and negative deviations from the mean profit enhance income smoothing. We base on this rationale in our ROE variable.

Our variable is constructed as a dummy variable, taking the value of 1 if the value of previous year's ROE deviates from average ROE for banks in the same country by more than 5 percentage points (in plus or in minus). The reasoning behind this is that banks, their shareholders and capital market investors use ROE as the main benchmark of profitability assessment. If a particular bank lands far below or far above average profitability in the sector, it may be more tempted to engage in income smoothing the following year, either to create reserves for future times (high earners) or exploit existing reserves to boost current profits (low earners).

Results in Specification 3 provide evidence that a link between past profits and current income smoothing did not exist in Central European banks in the 2005-2010 period. This may be caused by a few factors, apart from the real lack of the above reasoning in LLP creation. First, ROE is an imperfect profitability indicator, as it is frequently corrected by risk weighted

capital. In addition, ROE includes a tax element, which could distort the picture. Last but certainly not least, banks most probably compare themselves not to a national average, but to a chosen peer group, so a deviation from a national average (based on data only from banks in the sample) could not be adequate. We strongly believe that further research should be conducted in this area, as income smoothing in particular banks is most definitely affected by policies of peer institutions.

Conclusions

We have examined whether Central European banks used loan loss provisions to smooth their income in the period 2005-2010 and whether these provisions were procyclical towards bank internal and credit cycles and macroeconomic cycles. Our empirical findings provide evidence that Central European banks behave in line with their developed country counterparts. They display stable income smoothing trends, using periods of high profitability to build loan loss reserves, which are consumed in periods when earnings slump. On the other hand, no income smoothing nor procyclicality towards the credit expansion cycle is detected, unlike in some cases of developed banks, which are shown to decrease provisioning in credit boost times. Income smoothing may relate to the discretionary behaviour of bank managers, as it emerges after the default risk in the credit portfolio is controlled for.

On the other hand, Central European banks have been demonstrated to create provisions procyclically towards the macroeconomic cycle, not using expansion phases to create sound reserve buffers for future recessions. In consequence, during lower growth phases banks in Central Europe may be forced to use their capital to cover loan losses, which increases the procyclicality effects of existing capital regulations. This may contribute to a credit crunch and a longer time necessary to reach an economic rebound.

Annex

Table 6. Number of banks by country and year in the final sample.

	year						
Country	2004	2005	2006	2007	2008	2009	2010
BULGARIA	3	4	7	13	16	18	17
CROATIA	11	14	12	19	18	19	18
CZECH REPUBLIC	6	8	8	9	16	16	13
ESTONIA		1	1	1	3	4	2
HUNGARY	6	5	7	6	7	7	4
LATVIA	4	6	7	10	16	17	15

LITHUANIA	3	5	6	8	8	7	8
POLAND	1	11	14	13	17	20	16
ROMANIA	1	1	7	13	15	17	15
SLOVAKIA	7	6	6	10	11	10	9
SLOVENIA	4	8	10	10	14	14	14
TURKEY	9	12	14	19	22	25	24
SUM	**55**	**81**	**99**	**131**	**163**	**174**	**155**

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