Impact of competition and concentration on bank income smoothing in Central and Eastern European countries

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Abstract

Purpose – This study examines the impact of competition and concentration on bank income smoothing in Central and Eastern European (CEE) countries.
Design/methodology/approach – The two-step system GMM method was used to analyse the impact of competition and concentration on bank income smoothing in 17 CEEs from 2004 to 2015.
Findings – Loan loss provisions (LLPs) are negatively related to bank competition and concentration. The authors find no evidence for income smoothing using LLPs in a high-competition or high-concentration environment.
Research limitations/implications – A limitation of the study is that the analysis was restricted to commercial banks. The authors did not examine investment banks or microfinance banks in this study. Also, not having access to databases does not allow them to include recent years in the study.
Practical implications – CEE commercial banks will likely keep fewer provisions or engage in under-provisioning when they face intense competition, and this can expose them to credit risk, which may threaten their stability.
Originality/value – This study is the first to investigate the effect of concentration and competition on income smoothing among CEE banks.

Keywords Loan loss provisions, Competition, Concentration, Banks, Income smoothing
Paper type Research paper

1. Introduction

We examine whether banks in Central and Eastern European (CEE) countries uses loan loss provisions (LLPs) to smooth reported income in competitive and concentrated banking environments.

The global financial crisis reawakened policymakers' and academics' interest in bank competition and concentration. The competition affects the banking industry in three

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dimensions: efficiency, access to finance and stability (World Bank, 2012). The high competition in the banking sector affects bank funding, operating costs and net interest income (Beck *et al.*, 2006). It also influences bank managers to develop strategies to survive or outperform the competition. Such strategies often involve creative financial reporting techniques, improved risk management, mergers, acquisitions or subsidiary sell-offs (Kasman and Kasman, 2015; Solano *et al.*, 2020).

On the other hand, high concentration in the banking sector gives large banks significant market power, which they can use to fix the price of financial services and interest rates. This allows large banks to generate huge profits compared to small banks (Huang, 2020), and it also allows large banks to diversify into many activities to gain market share and increase profitability over time (Beck, 2008). Bank managers generally respond to a competitive or concentrated banking market by developing strategies to gain market share, increase profit and retain customers. One strategy is income smoothing using LLPs.

In this paper, we examine whether CEE commercial banks use LLPs to smooth their income after controlling for the level of competition and concentration in the banking environment. Previous studies have examined how European banks use LLPs to improve performance in different institutional and macroeconomic environments. For instance, Bouvatier *et al.* (2014) show that European banks with more concentrated ownership use LLPs to smooth their income. Peterson and Arun (2018) find that income smoothing using LLPs is pronounced among European systemic banks in the post-crisis period. Di Fabio *et al.* (2021) show that bank income smoothing is persistent when European banks have strict prudential supervision. Although these studies examine the European case, the literature has not examined income smoothing using LLPs in the context of banks in CEE countries. No studies have examined the impact of competition and concentration on bank income smoothing in CEE countries. Our study seeks to fill this gap in the literature.

Understanding how competition and concentration affect bank income smoothing in CEE countries is important because it can help us to (1) understand how banks in CEE countries manage their income in a competitive or concentrated environment, (2) determine whether income smoothing is a mechanism which CEE banks use to improve performance when they are in a competitive or concentrated banking environment and (3) to determine whether the bank income smoothing hypothesis holds true in CEE countries, since bank managers in CEE countries may have an incentive to report a smoother income due to competition from rival banks.

We argue that strong competition or concentration in the CEE region may influence bank managers to smooth income to remain profitable and to always appear competitive. Our empirical design analyses banks in CEE countries from 2004 to 2015. The empirical findings show that CEE banks do not use LLPs to smooth income in a high-competition or concentration environment. However, we find that bank LLPs are negatively related to bank competition and concentration.

Our study contributes to the literature in several ways. First, our study contributes to the literature on bank behaviour (e.g. Huy *et al.*, 2020a; Huy, 2021; Hang *et al.*, 2021). The study contributes to the banking literature investigating the determinants of bank income smoothing (see Peterson and Arun, 2018; Ozili and Outa, 2018). Our work contributes to this literature by focusing on bank income smoothing in the CEE countries – a context that has not been explored. Second, our study is the first in the literature to investigate the relationship between bank income smoothing, competition and concentration in CEE countries. Third, it is a contribution to the literature that explores the role of financial structure on bank performance. This study tests the effect of competition and concentration on banks' incentives to smooth income. Such analysis can provide insights into whether competition or concentration is a predictor of income smoothing among banks in CEE countries.

The rest of the study is structured as follows: The next section presents the contextual background, theory and literature review. The subsequent section presents the research methodology. In the next section, the empirical results are presented and discussed. In the next section, a discussion of the theoretical and managerial implications is provided as well as the limitations and areas for future research. The final section presents the conclusion of the study.

2. Literature review

2.1 Contextual background

We focus on the CEE region because it has an imperfect financial structure and a less developed financial system than Western European countries (Bayar and Gavriletea, 2018). In the last decade, the region has witnessed many changes in the banking industry as part of efforts towards European integration (Yildirim and Philippatos, 2007). However, these changes have had little effect on bank managers' discretion in managing bank income in the region because of weak institutions that are ineffective in monitoring and constraining bank managers from engaging in opportunistic behaviour. The weak institutions have also contributed to the failure to address competition and concentration problems in the CEE banking sector.

2.2 Income smoothing theory

The income smoothing theory was expounded by early scholars such as Beidleman (1973), Fudenberg and Tirole (1995) and Lambert (1984). Beidleman (1973) proposed that income smoothing is the intentional dampening of the fluctuations in reported income, and it is mainly achieved when managers use their discretion to move revenues and expenses from one accounting period to another or when managers use their discretion to increase or decrease the size of reported accruals to change the size of reported income. Beidleman (1973) demonstrates that the incentive to smooth income is stronger when the size of reported income is used as (1) a basis for evaluating the performance of managers, (2) an essential factor in the formulation of budgets for the next accounting period or (3) an aid in the making of capital acquisition decisions. Fudenberg and Tirole (1995) state that the incentive to smooth income is also more robust when there is a perception that current income receives more weight than past income when assessing the future, which gives managers a reason to smooth income. They use the flexibility allowed in accounting standards to change reported income without changing the underlying cash flow (Fudenberg and Tirole, 1995). For instance, managers can change accruals, such as LLPs or advertising expenses, to increase or decrease income. Fonseca and González (2008) argue that several factors in the external environment can give firms, particularly banks, added motivation to smooth income.

2.3 The competition–fragility hypothesis versus the concentration–stability hypothesis

Two hypotheses explain how competition and concentration affect bank performance. The first hypothesis is the competition–fragility hypothesis, which states that the greater competition among banks can lead to increased bank fragility (Alam *et al.*, 2019). This is because the greater competition will pressure banks to take excessive risks to increase profits. This can lead banks to lower their risk management standards or loan underwriting criteria to issue more loans to risky customers. This will expose banks to credit risk and lead to an increase in bank fragility. Since income smoothing can be viewed as a banking stability tool (Peterson and Arun, 2018), greater competition will lead to reduced income smoothing, analogous to higher bank fragility. The second hypothesis is the concentration–stability hypothesis, which Beck (2008) propounded. The concentration-stability hypothesis argues

that a concentrated banking system has large banks that can diversify their portfolio into diverse activities (Beck, 2008). This diversification helps to reduce bank risk, increase their income stream, increase profit and improve bank stability. A concentrated banking system also has a small number of banks that bank supervisors can easily monitor to ensure stability, thereby leading to a greater stability (Beck, 2008). More importantly, income smoothing is often considered as a bank stability tool, because it hides risks and gives the perception that the bank is stable (Peterson and Arun, 2018). Therefore, from the concentration–stability hypothesis perspective, it can be deduced that the bank concentration leads to a greater income smoothing when viewed as a tool for bank stability.

2.4 LLP and income smoothing studies

There are two broad categories of studies in the income smoothing and LLPs literature: studies investigating how bank-specific factors affect income smoothing using LLPs and how external factors affect bank income smoothing.

Several European studies show that bank-specific factors play a significant role in influencing banks to smooth income. For instance, Skala (2015) examined the case of Central European banks from 2004 to 2012 and found that banks use LLPs to smooth income and are procyclical with economic cycle variations. Skala (2015) did not consider the effect of competition and concentration on bank income smoothing. We extend Skala's (2015) study by focusing on CEE countries and assessing the effect of competition and concentration on bank income smoothing in CEE countries. Bonin and Kosak (2013) focused on banks in emerging European countries during the period of 1997–2010. They found that banks in emerging European countries use LLPs for income smoothing and capital management purposes. Also, Curcio and Hasan (2015) investigated the income smoothing practices of Euro-area and non-Euro area credit institutions from 1996 to 2006 and found that credit institutions in non-Euro area countries use LLPs to smooth income. Curcio and Hasan's (2015) study did not focus on CEE banks. Studies outside Europe have also examined the relationship between LLPs and bank income. For instance, Balboa *et al.* (2013) found similar evidence for banks in the USA. They found that the USA banks use LLPs to smooth positive income rather than the entire income distribution. Anandarajan *et al.* (2007) investigated the extent of income smoothing using LLPs by Australian commercial banks from 1991 to 2001. They found a positive relationship between LLPs and the income of Australian commercial banks, which indicates that they use LLPs to smooth income. These studies show that unobserved internal factors drive the need to smooth income since these studies did not control for external factors.

Other studies examined whether external factors influence banks to smooth income. Abou El Sood (2012) analysed 878 USA banks from 2001 to 2009 and found that the USA banks use LLPs to smooth income when they are more profitable and when they are not in a recession. In a different study, Kilic *et al.* (2013) were interested in whether changes in accounting regulation influenced banks to smooth income. In the study, Kilic *et al.* (2013) assessed whether SFAS 133 accounting disclosure rules prevented or encouraged the USA banks to use LLPs to smooth reported income. They examined a sample of the USA banks from 1999 to 2002. They found that the USA banks affected by the SFAS 133 rule increased their reliance on LLPs for income smoothing. In a related study, Leventis *et al.* (2011) examined whether the implementation of International Financial Reporting Standards (IFRS) in the European Union (EU) affected the use of LLPs to smooth income and manage bank capital. They analysed 91 EU-listed commercial banks from 1999 to 2008 and found that income smoothing was more pronounced among risky banks, but the extent of income smoothing reduced after implementing IFRS. These findings imply that IFRS standards improved the earnings quality of EU-listed commercial banks. Another study focused on how strong external supervision influences the extent of bank income smoothing. Curcio *et al.* (2017) examined

whether banks subjected to the 2010 and 2011 European Bank Authority (EBA) stress test exercises engaged in income smoothing. They found that banks participating in the EBA stress tests engaged in income smoothing only in 2011. Cummings and Durrani (2016) analysed 22 Australian banks from 2004 to 2012 and found that larger banks maintain higher LLPs than smaller ones because regulators and investors monitor larger banks more closely. These studies showed that external factors also drive the need to smooth income. Another external factor that may influence banks to smooth income might be competition and concentration. We will discuss this in the next section.

2.5 Studies linking bank income smoothing to competition and concentration

Few studies examined how income smoothing is affected by competition and bank concentration. Peterson and Arun (2018) were interested in how the competition among systemic banks influenced systemic banks to engage in income smoothing compared with non-systemic banks in Europe. They argued that competition among systemic banks would incentivise systemic banks to smooth income. They tested this argument by analysing 16 European countries from 2004 to 2013. They found that income smoothing was pronounced among systemic banks in the post-financial crisis period and pronounced among non-systemic banks in the pre-financial crisis period. Their result implies that competition among European systemic banks motivated them to smooth income to report competitive earnings. However, the study of Peterson and Arun (2018) did not consider banks in CEE countries. Hence, no implication can be drawn for CEE countries based on their findings. Bouvatier *et al.* (2014) were concerned about the bank concentration regarding direct equity ownership in a different European study. They argued that banks, whose shareholders have large equity ownership, may smooth income to create the perception that the bank manager is performing well and to create the impression that the bank is performing well so that they can receive rewards from their largest shareholders. Bouvatier *et al.* (2014) analysed some European commercial banks and found that banks with more concentrated ownership use LLPs for income smoothing. They also observed that income smoothing is reduced among banks operating in countries with strong supervisory regimes or higher external audit quality. Although these two European studies show interesting evidence of how income smoothing is influenced by competition and concentration, the two studies did not analyse banks in CEE countries. Therefore, no implication can be drawn for CEE countries based on their findings. In another study, Kwak *et al.* (2009) examined the relationship between institutional ownership and income smoothing using LLPs for Japanese banks from 1991 to 1999. They were interested in whether domestic institutional ownership or foreign institutional ownership had a significant impact on income smoothing. They found a positive relationship between bank concentration and income smoothing, which supports the concentration-stability hypothesis. These three studies show evidence that competition and concentration can affect bank income smoothing. However, evidence has not been documented for banks in CEE countries, creating a literature gap. We fill this gap in the literature by examining the case of banks in CEE countries in the next section.

3. Method

3.1 Data

The sample consists of 17 CEE countries. The countries are Albania, Bosnia and Hercegovina, Bulgaria, the Czech Republic, Estonia, Croatia, Hungary, Kosovo, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovenia, Slovakia, Lithuania and Latvia. The sample period is from 2004 to 2015. Competition and concentration data were collected from the World Bank's global financial development indicators (GFDI). Real gross

domestic product (GDP) growth rate data were obtained from the World Bank's World Development Indicators (WDI), while bank-specific variables were obtained from Bankscope. Some variables have missing observations, which yields unbalanced panel data. Table 1 reports the distribution of banks for each country in the sample.

3.2 The research model

The model we adopt is consistent with the LLP model used by Bouvatier *et al.* (2014), Curcio and Hasan (2015), Peterson and Arun (2018) and Ozili (2022a). The baseline models are specified below:

$$LLPi,t = \beta 1LLPi,t-1 + \beta 2EBTPi,t + \beta 3CPi,t + \beta 4SIZEi,t + \beta 5NPLi,t + \beta 6GDPGi,t + \beta 6(COMPETITION)i,t + \beta 7(CONCENTRATION) + ei,t \quad (1)$$

$$LLPi,t = \beta 1LLPi,t-1 + \beta 2EBTPi,t + \beta 3CPi,t + \beta 4SIZEi,t + \beta 5NPLi,t + \beta 6GDPGi,t + \beta 7(COMPETITION)i,t + \beta 8(CONCENTRATION) + \beta 9(EBTP*COMPETITION)i,t + \beta 10(EBTP*CONCENTRATION) + ei,t \quad (2)$$

where LLP = loan loss provisions to total assets ratio. EBTP = ratio of earnings before taxes and LLPs divided by total assets. SIZE = logarithm of the bank's total assets. GDPG = real GDP growth rate. CP = ratio of capital to total assets. NPL = ratio of nonperforming loans divided by total loans. COMPETITION = Boone indicator and H-statistic indicator. CONCENTRATION = Lerner index and five-bank asset concentration variables. e = error term.

Table 1. Summary of sample distribution

Country	*# Banks*
Albania	16
Bosnia and Herzegovina	33
Bulgaria	27
Czech Republic	40
Estonia	41
Croatia	49
Hungarian	20
Kosovo	6
Montenegro	13
North Macedonia	19
Poland	60
Romania	27
Serbia	36
Slovenia	24
Slovakia	23
Lithuania	11
Latvia	23

Source(s): Bankscope

3.3 Justifying the variables

The LLP variable is the dependent variable. It conveys information about the future deterioration of the bank's loan portfolio (Peterson and Arun, 2018; Ozili and Outa, 2018). LLPs cover expected credit losses, but bank managers can also manipulate them to meet other opportunistic objectives, such as smoothing income and for capital management purposes (Curcio and Hasan, 2015; Leventis *et al.*, 2011).

The EBTP ratio is the earnings variable. It is measured as the earnings ratio before tax and provisions to total assets. Many studies have used the EBTP variable and its relationship with LLPs to detect the presence of bank income smoothing (see, for example, Leventis *et al.*, 2011; Ozili, 2022a; Peterson and Arun, 2018). If the relationship between LLPs and EBTP is positive and statistically significant, it signals evidence of income smoothing, which means LLPs are used to smooth the size of earnings (EBTP). If the relationship is negative and statistically significant, it signals that income smoothing is absent, which means that LLPs are not used to smooth the size of reported earnings. The theoretical reasoning behind this is that if banks anticipate that their earnings will be low at the end of the financial year, they can reduce the size of reported loan loss provisions in order to increase reported profit to a certain level; conversely, if banks anticipate that their reported earnings will be too high, they can increase the size of LLPs to avoid reporting earnings that are too high which may attract regulatory and political scrutiny of bank profits (Leventis *et al.*, 2011; Peterson and Arun, 2018; Ozili, 2022a). Hence, income smoothing aims to report earnings that are neither too high nor too low. Therefore, we expect a positive relationship between LLPs and EBTP in CEE countries.

The bank capital to total assets ratio (CP) measures capital adequacy. Many studies have used this variable to account for bank managers' tendency to use LLPs to manage their capital levels (e.g. Bouvatier and Lepetit, 2008; Curcio and Hasan, 2015). Prior studies show that banks can reduce the size of LLPs to increase the size of bank capital when they are at risk of violating regulatory capital limits (see, for example, Curcio and Hasan, 2015; Ozili, 2019; Shala and Toçi, 2021). These studies document a negative relationship between LLPs and the CP variable, which suggests that LLPs are used for capital management purposes (e.g. Bikker and Metzemakers, 2005). Accordingly, we expect a negative relationship between LLPs and CPs for CEE banks. We also control for bank size (SIZE). This is because the literature shows that large banks will keep higher LLPs to compensate for the risks associated with their high volume of business activities, while smaller banks will keep fewer LLPs due to their economies of scale disadvantage or their low volume of business activities (see Peterson and Arun, 2018; Ozili, 2019). Therefore, we expect a positive relationship between the LLPs and SIZE variables for CEE banks. The real gross domestic product growth rate (GDPG) variable captures the impact of fluctuating macroeconomic conditions on loan loss provisions (Taktak *et al.*, 2010). The literature shows that banks often keep higher LLPs in bad economic times (i.e. during a recession) and keep fewer LLPs in good economic times (i.e. in periods of economic prosperity), which indicates a negative relationship between GDPG and LLPs (see, for example, Leventis *et al.*, 2011). Accordingly, we predict a negative relationship between LLPs and GDPG. The ratio of nonperforming loans to gross loans (NPL ratio) captures the quality of a bank's loan portfolio (Ozili, 2019). Asanović (2018) shows that high NPLs are one of the main challenges faced by monetary authorities in CEE countries, and banks will increase LLPs when they expect an increase in loan defaults (Ozili, 2018; Bikker and Metzemakers, 2005). Therefore, we expect a positive relationship between the LLP and NPL variables for CEE banks.

Regarding the competition variables, we used two variables to measure competition in the banking sector, namely, the Boone indicator (BN) and the H-statistic (HS). In theory, the Boone indicator captures the competition between banks in the banking market by measuring the

strength of the relationship between profits and marginal costs for different banks at one moment in time (Van Leuvensteijn, 2014). In theory, the H-statistic measures the elasticity of banks' revenue relative to input prices. Under the perfect competition, an increase in input prices raises both marginal costs and total revenues by the same amount, and hence, the H-statistic equals 1 (Dubovik and Kalara, 2018). The Boone indicator and H-statistic are widely used in the finance and economics literature to measure competition in the banking sector (Bolt and Humphrey, 2010; Diallo, 2015). In the analysis, we predict a negative relationship between LLPs and bank competition because banks operating in highly competitive environments would be reluctant to increase LLPs because an increase in LLPs would reduce reported profits and put the bank at a competitive disadvantage with rival banks. Therefore, banks in competitive environments will be incentivised to keep fewer LLPs to report high earnings. Following this reasoning, we expect a negative relationship between the LLPs variable and the two competition variables among CEE banks.

Regarding the concentration variables, we used two variables to measure banking concentration, namely, the Lerner index (LN) and the five-bank asset concentration variable (CN). The LN measures the ability of a bank to charge more than its marginal cost. It is a measure of monopoly power in the banking sector. The higher the value of the LN, the greater the monopoly power of banks. The five-bank asset CN refers to the assets of the five largest banks as a share of total commercial banking assets. A high value means that five banks have the largest assets in the banking sector, which indicates that the banking sector is highly concentrated. These two variables are widely used in the finance and economics literature to measure bank concentration (Shaffer and Spierdijk, 2020; Corvoisier and Gropp, 2002). In the analysis, we expect a negative relationship between LLPs and bank concentration because banks that have high market power can keep fewer LLPs to report persistently high earnings to reaffirm their market power in the banking market. However, a positive relationship between LLPs and bank concentration may be expected if bank lending becomes riskier as their markets become more concentrated. This will increase the risk of loan defaults and lead to higher LLPs. These two conflicting expectations indicate that we do not have a definite prediction for the relationship between LLPs and bank concentration. We summarized the *a priori* expectations in Table 2.

3.4 Estimation procedure: two-step system GMM

We use the two-step system GMM estimation method to analyse the data. The two-step system GMM estimation method is robust and corrects any endogeneity issues in the data. The system GMM also addresses the simultaneous problem usually found in the explanatory variables by employing adequate time-invariant instruments. The GMM method has been used in prior LLP studies such as Danisman *et al.* (2021) and Olszak *et al.* (2018).

4. Results

In this section, we report the results of the descriptive statistics, the correlation result and the regression results.

4.1 Descriptive statistics

Table 3 reports the descriptive statistics for the variables. The mean of the LLP variable is 1.3%, and the standard deviation of the LLP variable is much lower than the standard deviation of the NPL variable. The CP variable is 12.49% and has a high standard deviation. Similarly, the standard deviation of the GPDG variable is lower than that of the CN variable, which suggests a wide dispersion in bank concentration in CEE countries.

Variable	Prediction	Definition	Measurement	Data source
LLP		Loan loss provision ratio	Ratio of loan loss provision to total asset for bank i at time t	Bankscope
EBPT	+	Pre-provision and pre-tax earnings	Ratio of earnings before taxes and loan loss provisions divided by total asset	Bankscope
SIZE	+	Bank size	Logarithm of total asset	Bankscope
GDPG	–	Real GDP growth rate	Annual change in real gross domestic product	WDI
CP	–	Bank capital adequacy ratio	Ratio of bank capital to total bank asset	Bankscope
NPL	+	Nonperforming loan ratio	Ratio of nonperforming loan divided by gross loan	Bankscope
LN	+/–	Lerner index (market power). A measure of bank concentration	Measured as [output price – (marginal cost/output price)]	GFDI
CN	+/–	Five-bank asset concentration. A measure of competition	Ratio of the assets of the five largest banks as a share of total commercial bank assets	GFDI
BN	–	Boone indicator. A measure of competition	The elasticity of profit to marginal cost	GFDI
HS	–	H-statistic. A measure of competition	Measured as the elasticity of revenues relative to input prices	GFDI

Source(s): Bankscope and World Bank

Table 2. Information about variables

Variable	N	Mean	SD	Min	Max
LLP (%)	676	1.339	2.747	−30.19	35.92
EBPT (%)	766	0.362	5.514	114.1	50.51
SIZE	565	8.916	0.768	5.890	10.85
GDPG (%)	776	13.78	7.765	0	37.25
CP (%)	646	12.49	9.689	−2.460	98.03
NPL (%)	656	13.81	16.48	0.050	108.7
LN	776	0.247	0.106	−0.100	0.710
BN	766	−0.144	0.248	−2	0.240
CN	756	71.31	12.13	46.57	100
HS	696	0.579	0.165	0.220	0.960
BN* EBTP	560	−0.025	1.859	−41.90	53.58
LN* EBTP	550	0.126	1.318	−29.85	15.15
CN* EBTP	546	26.56	368.4	−8,648	4,085
HS*EBTP	566	−0.147	4.812	−115.1	31.76

Source(s): Authors' computation

Table 3. Descriptive statistics of the variables

4.2 Correlation analysis

Table 4 reports the Pearson correlation results. The correlation result shows that the LLP variable positively correlates with the EBTP variable, and the correlation is low at 0.26. The LLP variable is also positively correlated with the CP, NPL, GDPG and HS variables. In contrast, the LLP variables are negatively correlated with the SIZE, LN, BN and CN variables. Overall, the correlations among the variables were low. This means that multicollinearity is not a problem in the analysis.

Table 4.
Pearson correlation matrix for the variables

	LLP	EBTP	SIZE	CP	NPL	GDPG	LN	BN	CN	HS
LLP	1.000									
EBTP	0.269	1.000								
SIZE	−0.0702	0.3375	1.000							
CP	0.0652	−0.0112	−0.2777	1.000						
NPL	0.3448	−0.3463	−0.2882	0.0976	1.000					
GDPG	0.0772	−0.0245	−0.342	0.1078	−0.0739	1.000				
LN	−0.2445	0.1310	0.0657	−0.0793	−0.1059	−0.2797	1.0000			
BN	−0.0058	0.0402	0.0460	0.599	−0.0617	0.1590	−0.0141	1.000		
CN	−0.0768	−0.0346	−0.0518	0.0028	0.0025	−0.1798	−0.0772	−0.1171	1.000	
HS	0.0971	0.0232	0.2050	−0.0517	−0.0643	−0.0718	0.1627	−0.2091	0.3052	1.000

Source(s): Authors' own elaboration

4.3 GMM result for LLP determinants in CEE countries

The result is estimated using a two-step system of GMM regression estimation. It is reported in Table 5. We test the income smoothing hypothesis in column 1 of Table 5 without adding the competition and concentration variables. In the estimation, the EBTP coefficient is not significant in column 1. Regarding the control variables, the coefficients of the NPL, SIZE, CP

	(1) LLP Coefficient (t-statistic)	(2) LLP Coefficient (t-statistic)	(3) LLP Coefficient (t-statistic)	(4) LLP Coefficient (t-statistic)	(5) LLP Coefficient (t-statistic)	(6) LLP Coefficient (t-statistic)
LLPt-1	−0.107	−0.012	−0.011	−0.012	−0.007	1.100***
	(−1.10)	(−1.52)	(−1.41)	(−1.53)	(−0.98)	(15.99)
EBPT	0.026	−0.206***	−0.202***	−0.198***	−0.197**	−0.001
	(1.30)	(−4.41)	(−4.30)	(−3.93)	(2.03)	(−0.86)
NPL	0.009 (1.04)	0.021***	0.022***	0.021***	0.029**	0.012**
		(2.78)	(2.93)	(2.86)	(2.49)	(2.10)
CP	0.014	0.003	0.005	0.004	0.001	0.0001
	(0.82)	(0.19)	(0.28)	(0.23)	(0.03)	(0.016)
SIZE	0.222	0.255**	0.236**	0.237**	0.269**	−0.064
	(0.80)	(2.49)	(2.30)	(2.24)	(2.03)	(−1.11)
GDPG	0.065	0.119***	0.133***	0.146***	0.104**	0.0116
	(1.32)	(3.38)	(2.74)	(4.25)	(2.31)	(0.50)
LN		−1.363**				−0.884**
		(−2.56)				(−2.44)
BN			−0.245			0.004
			(−1.18)			(0.02)
CN				−0.001		−0.001
				(−0.18)		(−0.29)
HS					0.739*	0.285
					(1.73)	(1.39)
Constant	−0.683	−1.105	−1.349	−1.249	−2.152*	0.791
	(−0.25)	(−1.04)	(−1.30)	(−1.06)	(−1.66)	(1.124)
Observations	988	948	987	969	714	704
AR (1)p	0.0332	0.0305	0.0220	0.0295	0.0835	0.007
AR (2)p	0.678	0.0496	0.0767	0.0736	0.158	0.676
Hansen(p)	0.00637	0.0366	0.0274	0.0389	0.0138	0.325
Sargan(p)	0.000	0.000	0.000	0.000	0.000	0.00001

Source(s): Authors' computation

Table 5.
Testing the income smoothing hypothesis (Two-Step System GMM)

and GDPG control variables are insignificant in column 1 of Table 5. Regarding the competition and concentration variables, the results in columns 2 and 6 of Table 5 show that the LN and HS coefficients are significant and negatively related to LLPs. Meanwhile, the BN and CN coefficients are not significant in columns 3, 4 and 6. Hence, no meaningful conclusion can be drawn for the BN and CN variables.

4.4 Interaction analysis

In this section, we interact with the EBTP variable along with the competition and concentration variables to determine whether the relationship between LLP and EBTP is influenced by the competition and concentration in the CEE banking industry. Our focus is on the coefficients of the interaction terms reported in Table 6. The results show that all the interaction terms are statistically insignificant.

5. Discussion

5.1 Descriptive statistics

The descriptive statistics results reported in Table 3 show that CEE banks keep very low LLPs relative to their nonperforming loans and have sufficient capital to absorb unexpected losses. It also shows that CEE countries experienced strong economic growth during the sample period. It further shows a high concentration in the banking sector of CEE countries.

5.2 Correlation results

The Pearson correlation result reported in Table 4 shows that an increase in LLPs is associated with an increase in bank capital adequacy ratio, nonperforming loans, GDP

	(1) LLP Coefficient (t-statistic)	(2) LLP Coefficient (t-statistic)	(3) LLP Coefficient (t-statistic)	(4) LLP Coefficient (t-statistic)
LLPt-1	−0.128 (−1.40)	−0.101 (−1.00)	−0.157 (−1.28)	−0.147* (−1.88)
EBPT	−0.004 (−0.08)	0.017 (0.71)	0.084 (0.38)	0.024 (0.26)
NPL	0.010 (−1.12)	0.009 (1.10)	0.010 (1.17)	0.011 (0.21)
CP	0.015 (−0.98)	0.013 (0.73)	0.014 (0.75)	0.006 (0.29)
SIZE	0.241 (0.86)	0.224 (0.79)	0.226 (0.78)	0.304 (0.83)
GDPG	0.116* (1.88)	0.063 (1.24)	0.084 (1.25)	0.117 (1.09)
LN	2.320 (1.57)			
LN*EBTP	0.126 (0.56)			
BN		−0.011 (−0.03)		
BN*EBTP		−0.078 (−1.38)		
CN			−0.005 (−0.24)	
CN*EBTP			−0.001 (−0.28)	
HS				−0.025 (−0.02)
HS*EBTP				−0.007 (−0.06)
Constant	−1.477 (−0.52)	−0.709 (−0.26)	−0.354 (−0.13)	−1.319 (−0.39)
Observations	948	987	969	714
AR (1)p	0.032	0.033	0.032	0.042
AR (2)p	0.524	0.680	0.627	0.635
Hansen(p)	0.016	0.005	0.008	0.0152
Sargan(p)	0.000	0.000	0.000	0.000

Source(s): Authors' computation

Table 6. Interaction of LLP with competition and concentration variables (two-step system GMM)

growth and competition. Conversely, it was found that an increase in LLPs is associated with a decrease in bank size and concentration. This result is instructive because it signals that CEE bank regulators must monitor the correlation between bank LLPs and prudential ratios, particularly capital adequacy and nonperforming loan ratios. Such monitoring will enable CEE bank regulators to identify correlated risks that arise from the correlation between LLPs and the prudential ratios of CEE banks.

5.3 GMM regression results

The GMM regression results show that CEE banks do not use LLPs to smooth their income during the period examined. The result does not support the income smoothing hypothesis. However, it was found that CEE banks with greater market power keep fewer provisions as a strategy to report high profits, which helps them reaffirm their market power in the CEE banking market. Also, CEE banks that operate in highly competitive markets keep fewer provisions, possibly to report high profits and survive the competition in the CEE banking market. Furthermore, we observe that competition and concentration did not significantly affect income smoothing using LLPs for CEE banks, and this result does not support the competition–stability hypothesis. The implication is that other factors influence the relationship between LLP and EBTP but not competition and concentration.

5.4 Theoretical implications

The theoretical implication of the findings, based on the income smoothing theory, is that there are diverse determinants of bank income smoothing, and these determinants may change over time and across countries and regions. Our study showed that competition and bank concentration do not significantly explain the income smoothing behaviour of banks in CEE countries. This observation supports the theoretical expectation that some previously known determinants of income smoothing may be significant in a region and may become insignificant in another region due to regional differences. Hence, there is a need for further investigation to identify the regional determinants or factors that explain bank income smoothing.

5.5 Managerial/policy implications

Our findings have implications for bank managers. We showed that CEE bank managers keep fewer LLPs in high-competition and high-concentration environments. The implication of keeping few LLPs is that it can lead to under-provisioning and expose CEE banks to credit risk, mainly when unforeseen or unexpected losses occur and threaten the stability of CEE banks. CEE bank managers should be cautious when reducing the size of LLPs. They should find the threshold below which a further decrease in LLPs will threaten bank stability. Another managerial implication of our findings is that bank managers in CEE countries are more likely to use their discretion to alter the size of LLPs in response to credit risk considerations than for income smoothing purposes. Even without income smoothing, CEE bank managers will be incentivised to continue to report fewer LLPs estimates when they face high competition. Keeping high LLPs could signal that the bank expects nonperforming loans in the future. Such signalling is costly for banks because it can attract scrutiny from investors, competitors and regulators.

5.6 Limitations and future research agenda

A limitation of the study is that the analysis was restricted to commercial banks. We did not examine investment banks or microfinance banks in this study. Another limitation of the study is that we did not use other indexes of bank competition and concentration, which may

provide additional insights. Besides, in this work, we did not control for institutional quality in our empirical analysis. These limitations present some fruitful areas for further research.

Future studies can examine the effect of strict regulation on the extent of bank income smoothing in CEE countries. Future studies can also examine whether institutional quality reduces bank income smoothing in CEE countries. Future research can investigate the effect of other indices of bank competition and bank concentration on bank LLPs in CEE countries. Future studies can also assess whether income smoothing helps to improve financial management in banks and stock market development (Abad-Segura and González-Zamar, 2020; Huy *et al.* (2020b). Future studies can also assess whether changes in bank capital and risk can affect bank income smoothing in CEE countries (Majumder and Li, 2018; Canh *et al.*, 2021).

6. Conclusion

We analysed bank income smoothing in the Balkan countries, which comprises a large part of the CEE countries. This study is the first to empirically investigate the effect of competition and concentration on bank income smoothing in CEE countries. This paper examined the impact of competition and concentration on bank income smoothing in CEE countries. We analysed a sample of commercial banks in CEE countries from 2004 to 2015. We used bank-level data, two proxies of competition (Boone indicator and H-statistic) and two proxies of concentration (LN and the five-bank asset concentration). We test the hypothesis that CEE banks use LLPs to smooth income.

In the empirical results, the descriptive statistics showed that banks in CEE countries have high nonperforming loans and low provisions. They also have a high capital adequacy ratio and earnings. The correlation result showed that bank LLP is positively associated with the capital adequacy ratio, nonperforming loans, GDP growth and competition. In contrast, LLP is inversely correlated with bank size and concentration. The regression results showed a significant negative relationship between bank concentration and LLPs in CEE countries. A significant negative relationship exists between bank competition and LLPs in CEE countries. The results also showed that bank concentration and competition do not significantly impact bank income smoothing behaviour in CEE countries.

The policy implication of the findings is that other factors, apart from bank competition and concentration, drive bank income smoothing behaviour in CEE countries. Furthermore, the inverse relationship between LLPs and competition or concentration implies that CEE commercial banks facing intense competition in the banking market will keep fewer provisions or engage in under-provisioning. This behaviour can expose CEE banks to credit risk, which can materialize into unexpected losses and threaten the stability of CEE banks. Therefore, we recommend that bank supervisors increase their supervision of the LLPs estimates of CEE banks to ensure that they keep sufficient and high provisions to mitigate credit risk and for prudential regulatory purposes. Policymakers in CEE countries should also review the competition policies in the CEE banking sector and ensure that existing competition laws do not allow banks to significantly reduce their loan loss provisions or increase their credit risk exposure while seeking to remain competitive in the banking market.

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