The determinants of commercial banks' profitability in the South-Eastern Europe region: a system GMM approach

First draft: October 14, 2020

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Abstract

This study investigates the determinants of banks' profitability on a sample of 169 commercial banks located in 7 countries of South-Eastern Europe. Specifically, the study employs dynamic panel data analysis based on the generalized method of moments over a period spanning from 2003–2012. By using alternative measures of profitability, such as ROA and ROE, the results suggest that total assets and loan loss provision usually have more pronounced effects on Banks's profitability than other variables, and that macroeconomic variables are also usually statistically significant therefore highlighting their importance. Splitting the sample into small and large banks, we found that the determinants of profitability on small banks have a larger effect in comparison to large banks irrespective of the profitability measures used in the analysis; the opposite is the case on macroeconomic variables.

JEL classifications: G21
Keywords: profitability, banking, dynamic panel, SEE.

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1. Introduction

The South-Eastern Europe banking sector has gradually adapted itself following the reforms implemented by SEE governments to facilitate the transition of these countries to market-oriented economies. Between the second half of the 1990s and the 2000s a wide number of reforms were implemented by SEE governments that achieved the privatisation of most of the state-owned banks, the opening up of the privatised banking sector to foreign banks mainly from Western Europe, as well as interventions aims to align banking activities in SEE to the UE regulations as a precondition for the accession of SEE countries as new members of the UE. Since then, the banking sector of the SEE has been playing a relevant role to boost the economic growth in the region through the provision of credit to the domestic sector (see Table 1), whereas capital markets are still lagging behind in terms of companies' capitalisation (see Table 2). The profitability of SEE banks has become of interest for both policy makers and investors. The former aims to sustain rates of growth of the domestic economies and realise the importance of the role played by financially sound banks. The latter aims to improve and achieve better profitability of SEE banks

The goal of this study is to investigate the determinants of bank profitability for South-Eastern European countries. This study contributes to the existing empirical literature on the SEE banking sector in several ways. First, it does extend similar studies by using a more recent dataset that covers the period before, during and after the 2007-2009 global financial crisis. Secondly, it does investigate whether the determinants of profitability might have different effects on either large or small SEE banks. Third, we use alternative measures of profitability in order to check the robustness of the empirical results. Fourth, our study is the first to use a two-step dynamic panel approach in comparison to similar studies focusing on the determinants of bank profitability in the SEE banking context.

The rest of the paper is organised as follows. Section 3 presents a review of the relevant literature. Section 4 describes the sample selection, Section 4 presents the methodology. Section 5 presents the empirical results, and Section 6 concludes.

2. Literature Review

The empirical literature focusing on banking profitability can be divided into two main strands. The first strand focuses on the determinants of banks' profitability at country level. Recent studies include the banking sectors of the following countries: China (García-Herrero et al., 2009; Sufian, 2009), Greece (Pasiouras and Kosmidou, 2007; Athanasoglou et al., 2008), Japan (Liu and Wilson, 2010), Korea (Lee and Kim, 2013), Portugal (Garcia and Guerreiro, 2016); Serbia (Knezevic and Dobromirov, 2016), Switzerland (Dietrich and Wanzenried, 2011), the USA (Hannan and Prager, 2009; Chronopoulos et al., 2015), India (Almaqtari et al. 2018), and Vietnam (Batten and Vo, 2019). These studies are based on bank-specific and industry-specific profitability determinants as well as macroeconomic-specific determinants affecting bank-profitability. If we look at the effects of bank-specific variables on profitability, we observe that all the above mentioned studies show a negative effect of cost-to-income on banks' profitability confirming the hypothesis that the more efficient a bank is the higher is its profitability. Conversely, the effect of size on banks' profitability is mixed, whereas Pasiouras and Kosmidou (2007), Hannan and Prager (2009), Lee and Kim (2013), Chronopoulos et al. (2015), Knezevic and Dobromirov (2016), and Batten and Vo (2019) find a negative relationship and therefore the presence of diseconomies of scale for larger banks, Dietrich and Wanzenried, (2011) as well as Almaqtari et al. (2018) find evidence of a positive relationship, while Athanasoglou et al. (2008) do not find any statistical significance between size and profitability. The bank capital ratio, defined as equity-to-total assets, is found to have a positive relationship with banks' profitability for banks in China (García-Herrero et al., 2009), Greece (Athanasoglou et al., 2008), and Japan (Liu and Wilson, 2010) but negative in the case of US banks (Chronopoulos et al., 2015). By focusing on the effect of macroeconomic variables on Banks profitability, many individual-country studies show a positive effect of inflation rate on banks' profitability when the latter is measured by return on equity for the banking sectors of Vietnam (Batten and Vo, 2019). Individual country studies also include bank-industry variables to control for the effects on banks' profitability. One of the most popular bank-industry variables used in these studies is the Herfindahl-Hirschman-Index that controls for the effect of market structure on banks' profitability. Empirical results show that the impact of HHI is found to be positive in the case of banks' profitability in Greece (Athanasiglou et al., 2008) and the USA (Hannan and Prager, 2009), whereas it is negative in the case of the profitability of banks in Vietnam (Batten and Vo, 2019) and Japan (Liu and Wilson, 2010). Many individual country studies also control for the effect of the macroeconomic environment on banks' profitability. Analysing the effect of GDP growth on banks profitability, it is found that GDP growth has a positive effect on the profitability of banks in Greece (Pasiouras and Kosmidou, 2007), Switzerland (Dietrich and Wanzenried, 2011), Korea (Lee and Kim, 2013), Switzerland (Dietrich and Wanzenried, 2011) and the US (Chronopoulos et al, 2015), whereas the effect on banks' profitability is negative for Japanese banks (Liu and Wilson, 2010) as well as Vietnamese banks (Batten and Vo,

2019). Also, the effect of inflation is considered in many individual countries studies and the results show a positive effect on banks' profitability in Greece (Athanasoglou et al., 2008), and China (Garcia-Herrero et al., 2009) and Vietnam (Batten and Vo, 2019).

A second strand of the literature focused on the determinants of banks' profitability of cross-country banking sectors. Recent studies include the analysis of the banking sectors of countries grouped by alternative criteria such as geographical region, membership of Economic blocs, and stage of economic development. According to those criteria, recent cross-country studies include the Middle East and North African (MENA) countries (Ben Naceur and Omran, 2011; Olson and Zoubi, 2011, Caporale et al., 2017), Sub-Saharan African countries (Flamini et al., 2009), developed and developing countries (Goddard et al., 2011), Central and Eastern Europe and transition countries of the former USSR (Djalilov and Piesse, 2016), European Union (Pasiouras and Kosmidou, 2007), Latin America (2026), selected Balkan countries (Bucevska and Misheva, 2017), and emerging markets economies (Kohlscheen et al., 2018). Empirical findings presented in these studies show that in banking sectors of MENA countries, Central and Eastern Europe and transition countries of the former USSR, selected Balkan countries, the effect of banks' size on banks' profitability is not statistically significant (Ben Naceur and Omran, 2011), whereas a positive effects was reported in the case of EU banking sector (Pasiouras and Kosmidou, 2007). Further, the effect of cost-to-income ratio on banks' profitability is found to be negative for EU banks (Pasiouras and Kosmidou, 2007) as well as MENA banks (Olson and Zoubi, 2011). The effect of equity-to-asset ratio on banks' profitability is positive in the case of EU banks (Pasiouras and Kosmidou, 2007) as well banks located in selected Balkan countries (Bucevska and Misheva, 2017). Looking at the effect of macroeconomic variables, Kohlscheen et al. (2018) and Bucevska and Misheva (2017) find that GDP growth has no effect on banks' profitability of emerging markets and selected Balkan countries respectively, while a positive effect is found on the banks' profitability in the EU countries (Pasiouras and Kosmidou, 2007) and Sub-Saharan African countries. (Flamini et al., 2009). Conversely a negative and statistically significant effect is found on the banks' profitability of advanced and developing economies (Goddard et al., 2011). An additional macroeconomic variable used by the banks' profitability cross-country empirical literature is represented by the rate of inflation. The effect of inflation on banks' profitability is found to be positive and statistically significant in developing and advanced economies (Goddard et al., 2011), conversely the effect is negative and statistically significant in the case of MENA countries (Caporale et al., 2017) as well as emerging markets (Kohlscheen et al, 2018).

4. Methodology, determinants and stylised facts of banks' profitability

4.1 Dynamic panel system GMM model

To estimate the impact of bank-specific, industry-specific, and macroeconomic variables on banks' profitability, we use a methodology based on a dynamic panel model. Such a model specification is required when a lagged dependent variable is included among the regressors. Empirical studies investigating the determinants of banks' profits assume that the latter tend to persist over time; therefore these studies include variables indicating banks' profits also as a lagged variable among the regressors. In doing so, these empirical studies recognise the existence of an endogeneity problem, that is current observation of the explanatory variables are not completely independent of past value of the dependent variable. Therefore, in our study we investigate the determinants of banks' profitability for SEE banks, by using the following dynamic specification:

$$\Pi_{i,j,t} = c + \alpha\Pi_{i,j,t-1} + \sum_{j=1}^{J}\beta_j X_{i,j,t}^{j} + \sum_{l=1}^{L}\beta_l X_{i,j,t}^{l} + \sum_{m=1}^{M}\beta_m X_{i,j,t}^{m} + \varepsilon_{i,j,t} \quad (1)$$

where Π_{it} represents the profitability of bank *j*, located in country *i* at time *t*, with $i = 1, \ldots, N, t = 1, \ldots, T$, c is a constant term, $\Pi_{i,j,t-1}$ is the one-period lagged of profitability and α the speed of adjustment to equilibrium, $X_{i,j,t}^{j}$ are bank-specific explanatory variables, $X_{i,j,t}^{l}$ are industry specific regressors, $X_{i,j,t}^{m}$ are macroeconomic regressors, and $\varepsilon_{i,j,t}$ is the disturbance term made up of the unobserved bank-specific effect $v_{i,j,t}$ and the idiosyncratic error $u_{i,j,t}$. By construction, the unobserved bank-specific effect v_i is correlated with the lagged dependent variable $\Pi_{i,j,t-1}$ making panel standard (fixed or random effects) estimator inconsistent. To overcome this problem Arellano and Bond (1991), proposed a consistent Generalized Method of Moments (GMM) estimator. Arellano-Bond dynamic panel estimation is called *difference GMM* since it starts by transforming all covariates, by differencing, and then uses the GMM (Hansen, 1982). The distinctive aspect of the *difference GMM* is then to transform the data to remove the fixed effects. A potential problem with the *difference GMM estimator* is that if regressors are close to a random walk, then the difference GMM approach performs poorly because past values of random walk regressors convey little information when their difference is used (Blundell and Bond,1998). To overcome this problem, Blundell and Bond (1998) building on Arellano and Bond (1995), instead of transforming the regressors, they suggested transforming the instruments so that they are exogenous to the fixed effects. This approach, as outlined in Blundell and Bond (1998), is formalised in a system of two equations, that is a level and a transformed equation respectively, and is known as *system GMM* (Roodman, 2009). To overcome this problem, Blundell and Bond (1998) develop an alternative approach that rather than transforming (i.e. differencing) the regressors, it transforms the Instrument (Roodman, 2009). The validity of

additionally included instruments is tested by means of a Hansen test for overidentifying restrictions In addition, the Arellano-Bond test for autocorrelation in the idiosyncratic disturbance term (v_t) are conducted. In particular, the Arellano-Bond test is applied to the first order ($\Delta v_{i,t-1}$) and second order ($\Delta v_{i,t-2}$) residuals in differences (Roodman, 2009).

4.2. Determinants of bank profitability

The variables we used in equation (1) to investigate the determinants of banks' profitability are presented in Table 1. Column (1) of Table 1 presents the alternative dependent variables we use in equation (1) while Panel B shows the independent variables. The latter are grouped in bank-specific and industry-specific variables, as well as macroeconomic variables. An indication about the potential impact of the independent variables) on the dependent variables is presented in column 4) of Table 1. A discussion about the reason the variables presented in Table 1 were used in equation (1) is presented in the following subsections.

Table 1 - Variables description

(1)	(2) Symbol	(3) Measure	(4) Expected sign
Panel A: Dependent Variables			
Return-on-Assets	ROA	Profitability	NA
Return-on-Equity	ROE	Profitability	NA
Panel B: Independent variables			
Bank-specific variables			
Cost-to-income ratio	CI	Efficiency	
Equity-to-Asset ratio	EQAST	Capital risk	+/-
Loan Loss Provisions to Total loans ratio	LLPTL	Credit risk	+/-
Loans to Total Assets	LTA	Liquidity Risk	+/-
Operating expenses to total assets ratio	OETA	Efficiency	+/-
Total Assets	TA	Size	+/-
Industry-specific variables			
Herfindahl-Hirschman-Index	HHI	Market Share	+/-
Bank Ownership	OWNS	Ownership	+/-
Macroeconomic variables			
GDP growth rate	GDPGR	Economic growth	+/-
Inflation rate	INF	Prices growth	+/-

Notes. The data used to calculate bank-specific and industry-specific variables is from BankScope. The data for macroeconomic variables is from the World Bank – World Development Indicator database. The HHI index was calculated by using the deposits market.

4.2.1 Bank-specific variables

Many studies focusing on the determinants of banks' profitability (Liu and Wilson, 2010; Dietrich and Wanzenried, 2011; Olson and Zoubi, 2011; Chronopoulos et al., 2015; Garcia and Guerreiro, 2016; Caporale et al., 2017; Almaqtari et al, 2018; Batten and Vo, 2019) used two alternative banks' profitability measures, that is return on assets (ROA) and returns on equity (ROE). The former measures the return earned by a bank on its assets, whilst the latter measures the return earned by a bank on its equity capital. ROA indicates how effectively in terms of earnings a bank is managing its bases of assets which are usually financed via both equity holders and creditors. On the other hand, ROE indicates how effectively in terms of earnings, a bank is using shareholders' capital. Following the mentioned literature and for comparative purposes, we also used in our study both ROA and ROE as measures of banks' profitability.

Bank size is widely used as a determinant of banks' profitability (see, for instance, recent studies such as Bucevska and Misheva, 2017; Caporale et al., 2017; Kohlscheen et al, 2018). Following similar studies, we proxy bank size by total assets (AST) which we include as a regressor in eq. (1) in order to capture the effect of bank size on profitability. We may expect either a negative or positive effect of bank size on profitability. Large banks may benefit from economies of scale or scope (Goddard et al., 2004) that would result in lower costs and higher profits, while small banks may encounter diseconomies of scale, that would lead them to higher costs and lower profitability. However, it may also be that extremely large banks are characterised by a bureaucratic structure that affects their profitability and therefore they may encounter diseconomies of scale. This also means that the size-profitability relation may be non-linear (Athanasoglou et al., 2008; Lee and Kim, 2013). Therefore, we also include a quadratic term of bank size to capture any nonlinearity in the size-profitability relationship.

The ratio of Equity to Total Assets (EQAST) is used as a measure of capital strength. The direction of the impact of that measure on banks' profitability might be either positive or negative. Overcapitalised banks operate over-cautiously and might ignore profitable opportunities (Goddard et al., 2010). Conversely, Berger (1995) presented an *expected bankruptcy cost hypothesis* in accordance with the relationship between capital and profitability which is argued to be positive. As pointed out by Berger (1995), the positive relationship is based on the hypothesis that distressed banks might be able to raise additional capital, this would then lead them to realise better earnings via lower interest rates paid on uninsured debt.

In our equation (1) we include also the ratio of loan loss provisions to total loans (LLPTL) in order to capture the impact of credit risk on banks' profitability. The LLPTL ratio is expected to be negatively related to banks' profitability (Athanasoglou et al, 2008), since a deterioration of the bank's loans portfolio might result in a further increase of provisions held for loan losses which then leads to a lower banks' profitability (Garcia and Guerreiro, 2016). According to similar studies (see, for instance, Liu and Wilson, 2010; Garcia and Guerreiro, 2016) we expect a negative relationship between banks' profitability and the ratio of loan loss provisional to total loans.

An additional variable we include as a regressor in equation (1) is loans to total assets ratio (LTA). This bank-specific variable is very often used as a measure of liquidity risk (see, for instance, Olson and Zoubi, 2011; Kohlscheen et al., 2018) Since loans are the main financial service sold by banks, LTA is expected to have a positive impact on banks' profitability.

4.2.2 Industry-specific variables

We use Herfindahl-Hirschman-Index (HHI) as well as banks' ownership (OWNS) to control for the effects of bank industry-specific variables on banks' profitability. The former variable allows testing for the existence of Structure *Conduct Performance* (*SCP*) hypothesis. If a positive relationship between market concentration (measured by HHI) and banks' performance (measured by profits) is found, then this provides evidence for the existence of the SCP hypothesis. Many studies of profitability (see, for instance, Liu and Wilson, 2010; Chronopoulos et al, 2015; Batten and Vo, 2019), found a negative and statistically significant effect of HHI on banks' therefore challenging the existence of the *SCP* hypothesis. We want to measure also the effect of banks' ownership (i.e. domestic versus foreign ownership) on banks' profitability. Some authors (see, for instance, Demnirguci-Kunt and Huizinga, 2000; Claessens et al., 2001) argue that in developing countries, foreign banks can generate higher interest margins and therefore higher profitability in comparison to domestic banks. The opposite is however found in developed countries, as foreign banks are found to be less profitable than domestic banks. In our study, we then want to investigate the possibility that different ownership types (either domestic or foreign) impact differently on banks' profitability. Therefore, we include an ownership dummy variable equal to one if the bank is foreign, zero if it is a domestic bank.

4.2.3 Macroeconomic variables

To control for the effect of the macroeconomic environment on banks' profitability we used two variables which are Real GDP growth (RGDPG) and rate of inflation (INF). The former was used to determine the effect of economic growth on banks' profitability. Many studies (see, for instance, Sufian, 2009; Liu and Wilson, 2010; Dietrich and Wanzenried, 2011; Lee and Kim, 2013; Chronopoulos et al., 2015; Garcia and Guerreiro, 2016) have shown that the mentioned effect is usually positive as banks are likely to lend more during buoyant economic conditions. The additional macroeconomic variable we included was inflation rate. It has been pointed out (see, for instance, Flamini et al., 2009; Bucevska and Misheva, 2017) that the effect of inflation rate on banks' profitability depends on whether banks are able to anticipate future movement of price increases. If that is the case, an increase in the rate of inflation results in an increase of banks' profitability, conversely banks' profitability declines. Some other studies (see, for instance, Athanasoglou et al., 2008) point out that the relationship between banks 'profitability and inflation is ambiguous, and it is quite difficult to establish a priori effect.

A similar procedure was used in Goddard et al. (2001), as the authors collected variables in domestic currency, converted them into ECU and removed the effect of inflation by using an ECU GDP deflator.

3. Data

Our study covers the banking sectors of seven SEE countries; that is: Albania, Bosnia-Herzegovina, Bulgaria, Croatia, FYROM, Romania and Serbia. We considered commercial banks only and excluded investment banks, cooperative banks, and other non-banking credit institutions. Commercial banks are based on a business model which is quite different in comparison to other banking firms such as saving banks and investment banks (Fiordelisi et al., 2011). In our dataset only commercial banks with at least three years of continuous data were considered. In accordance with these criteria, our sample include 169 commercial banks[3] and 17,509 observations at bank level gathered from *BankScope*. The data gathered from *BankScope* was, in most cases, in the domestic currency. This was then converted into US dollars by using a spot exchange rate between each domestic currency and the U.S. dollar. After converting the data into this common currency, the effects of inflation were then removed by using the U.S. GDP deflator from the U.S. National Bureau of Economic Analysis with all values expressed in 2009 prices.[4] We complemented bank-level data with

[3] In particular we ended up with 12 Banks from Albania, 24 from Bosnia-Herzegovina, 22 from Bulgaria, 33 from Croatia, 13 from FYROM, 30 from Romania, and 35 from Serbia.

[4] A similar procedure was used in Goddard et al. (2001), as the authors collected variables in domestic currency, converted them into ECU and removed the effect of inflation by using an ECU GDP deflator.

macroeconomic data at country level sourced from the World Bank –World Development Indicators database. Our data set also include information about whether banks are domestic or foreign ownership taken from the Claessens and Van Horen database.[5] Table 2 illustrates the descriptive statistics for the variables used in our study. On average, SEE banks in our sample have a ROA of 0.477% over the period 2003-2012. Our second measure of profitability, ROE, amounts to 7.11%. on average. On average the capital-asset ratio is 0.17, therefore the capitalisation of SEE banks is 17%. The loan loss provision to total loan ratio, which is an indicator of credit risk, is 0.026, therefore on average the loan loss provision is 2.6% of the total loan over the period under study. The ratio of operating expenses to total assets (OETA), which is an indicator of operating efficiency, is 0.529. The average size of banks in our sample is 1449 USD million, which, however, differs among banks. The largest bank in our sample, for instance, has total assets equivalent to 28334 USD million, whereas the smallest bank has assets for a total value of 10 USD million. The HHI, as a measure of bank concentration, is 2014. On average GDP growth for SEE was 2.8% whereas on average the rate of inflation was 2.52%. The correlation matrix (Table 3) shows that correlation among independent variables are in most of the cases statistically significant.

Table 2 – Descriptive statistics

	Number of observations	Mean	St Dev	Median
Dependent Variables				
ROA	1299	0.447	3.281	0.98
ROE	565	7.111	19.476	9.179
Independent variables				
Bank-specific variables				
CI	1299	0.529	0.285	0.472
EQAST	1283	0.174	0.121	0.135
LLPTL	1262	0.026	0.069	0.013
Loan growth	1130	0.278	0.549	0.138
TA	1305	1499.894	3174.875	393.426
Industry-specific variables				
HHI	1314	2014.254	4567.399	1421.45
Ownership	1318	-	-	-
Macroeconomic variables				
GDPGR	1314	2.803	3.841	3.8
GDPGR _squared	1314	22.596	21.432	18.318
INF	1262	2.519	1.733	2.188

Notes. This table reports descriptive statistics for dependent and independent variables used in the empirical analysis. The notation of the variables and their detailed definition is presented in Table 1.

Table 3: Cross-correlation matrix for covariates

	EQAST	LLPT	CI	TA	HHI	OWN	GDP growth	INF	LOAN growth	GS
EQAST	1									
LLPT	0.034	1								
CI	0.292***	-0.062**	1							
TA	-0.191***	-0.043	-0.237***	1						
HHI	0.104**	-0.025	0.035	-0.055**	1					
OWN	0.071**	0.060**	0.00	-0.254***	0.035	1				
GDP growth	0.055**	-0.001	0.027	-0.115***	0.126***	0.005	1			
INF	0.151***	0.156***	0.163***	-0.080***	-0.288***	-0.025	0.34***	1		
LOAN growth	-0.031	-0.1***	0.082***	-0.08***	0.026	-0.00	0.361***	0.144***	1	
GS	0.001	0.045	-0.024	-0.006	0.092***	-0.002	0.527***	0.248***	0.247***	1

Notes. This table reports the cross-correlations of independent variables used in the regression analysis. See Table 1 for variable definitions. ***/**/* indicate statistically significance at 1%, 5%, 10% respectively. The notation of the variables and their detailed definition is presented in Table 1.

5. Empirical results

Table 4 and Table 5 reports GMM system estimations of Eq. (1) by using two alternative measures of banks' profitability, that is ROA (Table 4) and ROE (Table 5), respectively. Eq. (1) was estimated using a two-step GMM estimator. To check the robustness of our results, we estimated four alternative models and presented the results in both the mentioned tables. In the first model we exclude loan growth and GDP growth squared. In the second model we excluded GDP growth and GDP growth squared. In the third model we excluded GDP growth squared, while in the fourth model we included all the three mentioned variables. The results we presented in Table 4 and Table 5 are generally consistent across the different alternative models.

[5] To retrieve information about bank ownership we used the Claessens and Van Horen database provides full ownership information over the period 1995–2013 for 5,498 banks active in 137 countries. Among other things, this database includes for each bank the type of ownership (foreign or domestic) on a yearly basis. More information about this database is available at http://www.dnb.nl/en/onderzoek-2/databases/index.jsp

The effect on banks' profitability of the equity to asset (EQAST) ratio is positive on both ROA and ROE, as presented in Table 4 and Table 5. Further, compared to other profitability's determinants, the effect of EQAST is the largest on either ROA or ROE. These results are consistent with previous studies (Pasiouras and Kosmidou, 2007; Liu and Wilson 2010; Bucevska and Misheva, 2017; Kohlscheen et al., 2018) and provide support to the case that better capitalised banks face lower funding costs and this therefore results in higher profitability.

The effect of loans provision to total loan (LLPTL) is negative and statistically significant on both ROA (Table 4) and ROE (Table 5). Similar results are found in single-country studies focusing on the banking systems of Korea (Jeon and Miller, 2004), (Athanasoglou et al, 2008) and Portugal (Garcia and Guerrieiro, 2009). Our results are similar to the findings presented in studies such as Jeon and Miller, (2005) and Garcia and Guerrieiro, (2009). The mentioned negative effects are not surprising, given that banks in SEE have had very high loan loss provisions due to the poor quality of their loan portfolio. Therefore, SEE banks had to accumulate loan loss provision in the perspective of writing off bad debt.

The relationship between CI and either ROA or ROE is negative and statistically significant. The estimated CI's coefficients are larger than any other banks' profitability determinant variable. Our results are consistent with similar cross-country studies (see, for instance, Goddard et al, 2010), as well as single country studies (see, for instance, Liu and Wilson, 2010; Dietrich and Wanzenried, 2011), and indicate that a reduction of costs aiming at making SEE banks more efficient is of paramount importance to increase their profitability.

The effect of bank size (TA) on banks' profitability is positive and statistically significant on ROA only. This implies that as banks increase their size, they then benefit from economies of scale and this results in higher reported profits. This outcome showing that larger banks are generally more profitable is consistent with similar studies (see, for instance, Olson and Zoubi, 2011; Kohlscheen et al., 2018). However, the results of previous studies are mixed up. Some studies focusing on single countries in the EU (see, for instance, Pasiouras and Kosmidou, 2007) found a negative effect of TA on banks' ROA which lead to the hypothesis that larger banks face diseconomies of scale while smaller banks are able to capture benefits of both economies of scale and scope (Pasiouras and Kosmidou, 2007). However, as pointed out by Lee and Kim (2013) is it possible that as banks increase their size coordination problems might become more acute suggesting the hypothesis of a nonlinear relationship between bank size and performance. Conversely, other country-level studies (see, for instance, Athanasoglou et al. 2008) and group-country studies focusing on selected Balkan countries (Bucevska and Misheva, 2017) do not find any significance statistically effect of banks' size banks' profitability.

We found that the effect of bank concentration (HHI) on either ROA or ROE is not statistically significant. This result therefore to reject the SCP hypothesis for SEE banks, according with additional market power yields more profits. Studies focusing on South-Eastern European countries also found that industry concentration measures have not statistically significant effects on banks' profitability (see, for instance, Bucevska and Misheva, 2017). Goddard et al., (2013), studies focusing on Western European countries, find mixed results about the effect of bank concentration on banks' profitability measure in terms of sign and statistical significance.

The impact of ownership type (OWNS) on banks' profitability shows that foreign-ownership makes SEE banks more profitable in comparison to domestic-owned banks. The estimated coefficient of OWNS is positive and statistically significant across all the estimated models of Table 4 when ROA is used as indicators of profitability, while just only in the case of Moodle 3 of table A when the alternative measure ROE is used. Our results are not consistent with other studies. Pasiouras and Kosmidou (2007) found that the profitability of foreign-owned commercial banks in Greece is lower than domestic-owned banks.

The impact of the indicators of macroeconomics conditions on the ROA is positive and statistically significant for model (1) and model (2). This suggests that bank profitability, as measured via ROA, is affected by the state of the economy, with profitability increasing during macroeconomic expansion periods, and declining when macroeconomics conditions deteriorate. Further, the effect of inflation on ROA is positive and statistically significant only in the case of Model (2).

A natural question is whether determinant of banks profitability might have a different effect in relation to the size of the bank in which the investigation is undertaken. To address that question, we calculated the median of total assets of our datasets of SEE banks and divided them in two groups. The median of total assets was $447.85 million. Therefore, we identified 85 banks with total assets, on average, lower that $447.87 million over the period 2004-2012, and a second group with 84 banks with a value of total assets larger than $447.83 million. We grouped then the first group as small banks and the second group as large banks. We estimated equation (1) on both groups and reported the results in Tables 6, 7, 8, and 9.

When we use ROA as a measure of profitability, we found that the determinants of banks' profitability have an effect usually on SEE small banks (Table 6) larger than what we observe in the case of large SEE commercial banks (Table 7). Furthermore, the effect of loan growth is statistically significant only on the profitability of small banks whilst no effect is found on the profitability of large SEE commercial banks, The effect of inflation rate is generally found statistically significant on the profitability of large SEE commercial

banks (Table 7) while limited evidence of this is found in the case of small banks (Table 6). Profitability of large banks is also affected positively by the variable GDP growth (Table 7), that conversely does not seem to have any statistically significant effects on the profitability of small SEE banks (Table 6).

Table 8 and 9 presents the estimated coefficients of equation (1), for small and large banks when ROE is used as a measure of profitability. Our findings show that profitability of small banks as well as large SEE banks is affected by the same determinants in both cases. The major differences are related to the variable loan growth which is found to have a positive and statistically significant effect on the profitability of large SEE banks (Table 9) but not on small SEE banks (Table 8). Secondly, the variable ownership is found to have a positive effect on the profitability of small SEE banks (Table 8) but not on large banks (Table 9). When we use ROA as a measure of profitability, we found that the determinants of banks' profitability have a more pronounced effect on SEE small banks (Table 6) than what we observe in the case of large SEE commercial banks (Table 7) . Furthermore, the effect of loan growth is statistically significant only on the profitability of small banks whilst no effect is found on the profitability of large SEE commercial banks, The effect of inflation rate is generally found statistically significant on the profitability of large SEE commercial banks (Table 7) while a limited evidence of this is found in the case of small banks (Table 6). Profitability of large banks is also affected positively by the variable GDP growth (Table 7), that conversely does not seem to have any statistically significant effects on the profitability of small SEE banks (Table 6).

Table 4 – Determinants of profitability (ROA) of SEE commercial banks

	Model 1	Model 2	Model 3	Model 4
Dep var (-1)	0.10	0.019	0.090	0.122
	(0.132)	(0.147)	(0.134)	(0.136)
lnEQAST	**1.36*** **	**1.491*** **	**1.378*** **	**1.339*** **
	(0.394)	**(0.396)**	**(0.395)**	**(0.399)**
lnLLPTL	**-0.928*** **	**-0.981*** **	**-0.885*** **	**-0.872*** **
	(0.194)	**(0.219)**	**(0.185)**	**(0.182)**
lnCI	**-2.336*** **	**-2.699*** **	**-2.429*** **	**-2.377*** **
	(0.615)	**(0.583)**	**(0.632)**	**(0.609)**
lnTA	**0.314** **	**0.346*** **	**0.320** **	**0.312** **
	(0.118)	**(0.111)**	**(0.118)**	**(0.116)**
lnHHII	0.254	0.443	0.172	0.273
	(0.389)	(0.406)	(0.396)	(0.357)
OWNS	0.548*	**0.612** **	**0.559** **	**0.542** **
	(0.281)	**(0.239)**	**(0.283)**	**(0.276)**
Loan growth	-	**0.649** **	**0.677** **	**0.716** **
		(0.286)	**(0.336)**	**(0.339)**
GDPGR	**0.072** **	-	0.046	**0.055** **
	(0.028)		(0.029)	**(0.027)**
GDPGR_squ	-	-	-	-0.007
				(0.007)
INF	0.113	**0.196** **	0.091	0.113
	(0.072)	**(0.073)**	(0.074)	(0.073)
Constant	**-7.346** **	**-9.342*** **	**-6.692** **	**-7.285*** **
	(2.832)	**(3.158)**	**(2.835)**	**(2.651)**
Number of obs	825	720	825	827
AR(2)	0.172	0.129	0.254	0.200
Hansen Test	0.110	0.105	0.187	0.132

Table 5 – Determinants of profitability (ROE) of SEE commercial banks

	Model 1	Model 2	Model 3	Model 4
Dep var (-1)	**0.561****	**0.541****	**0.699*****	**0.624****
	(0.253)	**(0.256)**	**(0.247)**	**(0.281)**
lnEQAST	**9.987***	**9.052***	**4.313*****	**9.78***
	(5.517)	**(5.172)**	**(1.745)**	**(5.171)**
lnLLPTL	**-5.004*****	**-5.219*****	**-4.426*****	**-4.374*****
	(1.744)	**(1.536)**	**(1.345)**	**(1.472)**
lnCI	**-9.515*****	**-10.022*****	**-10.285*****	**-9.565*****
	(3.505)	**(3.579)**	**(3.485)**	**(3.664)**
lnTA	0.608	0.665	-2.443	0.504
	(1.044)	(1.032)	(1.787)	(1.024)
lnHHII	1.286	2.937	-2.607	-0.315
	(3.350)	(3.597)	(3.221)	(3.334)
OWNS	0.869	-1.471	**-18.283****	-1.472
	(3.452)	(3.559)	**(8.925)**	(3.564)
Loan growth	-	**8.801****	**9.528***	**6.976****
		(3.55)	**(5.988)**	**(3.487)**
GDPGR	**0.864*****	-	0.509**	**0.647*****
	(0.136)		(0.208)	**(0.148)**
GDPGR_squ	-	-	-	-0.018
				(0.032)
INF	-0.507	0.137	-0.397	-0.673
	(0.595)	(0.725)	(0.654)	(0.682)
Constant	-2.342	-38.368	21.288	-7.612
	(26.555)	(30.721)	(28.377)	18.492)
Number of obs	304	303	348	303
AR(2)	0.186	0.225	0.295	0.212
Hansen Test	0.349	0.154	0.413	0.583

Table 6 – Determinants of profitability (ROA) of SEE small commercial banks

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Dep var (-1)	-0.050	-0.201	-0.047	0.022
	(0.146)	(0.126)	(0.143)	(0.152)
lnEQAST	**1.782****	**2.488*****	**1.857****	**1.845****
	(0.677)	**(0.658)**	**(0.693)**	**(0.699)**
lnLLPTL	**-1.178*****	**-1.417*****	**-1.157*****	**-1.139*****
	(0.313)	**(0.339)**	**(0.3)**	**(0.239)**
lnCI	**-3.955*****	**-5.482*****	**-3.946*****	**-3.879*****
	(1.251)	**(0.966)**	**(1.261)**	**(1.228)**
lnTA	0.522	**0.68***	0.515	0.504
	(0.431)	**(0.367)**	(0.463)	(0.458)
lnHHII	-0.17	0.17	-0.308	0.229
	(0.659)	(0.665)	(0.653)	(0.619)
OWNS	**0.929***	**0.906****	**1.044****	**0.998****
	(0.477)	**(0.426)**	**(0.484)**	**(0.47)**
Loan growth	-	**0.936****	**1.154****	**1.152****
		(0.445)	**(0.555)**	**(0.555)**
GDPGR	**0.12****	-	0.078	**0.098***
	(0.059)		(0.054)	**(0.051)**
GDPGr squared	**-**	-	-	0.009
				(0.014)
INF	0.056	0.194	0.018	0.033
	(0.109)	(0.121)	(0.126)	(0.122)
Constant	-6.888	**-11.143****	-5.774	-6.045
	(5.028)	**(5.38)**	(4.938)	(4.761)
Number of obs	366	291	352	352
Arellano-Bond test for AR(2)	0.224	0.367	0.622	0.5
Hansen over-identification test	0.149	0.234	0.310	0.174

Table 7 – Determinants of profitability (ROA) of SEE large commercial banks ROA

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Dep var (-1)	**0.281****	0.129	**0.309****	**0.315****
	(0.119)	(0.121)	**(0.122)**	**(0.119)**
lnEQAST	**0.807****	**0.886****	**0.794*****	**0.777****
	(0.314)	**(0.368)**	**(0.293)**	**(0.296)**
lnLLPTL	**-0.675*****	**-0.693*****	**-0.629*****	**-0.631*****
	(0.177)	**(0.174)**	**(0.163)**	**(0.161)**
lnCI	**-1.088****	**-1.289*****	**-1.166****	**-1.175*****
	(0.446)	**(0.459)**	**(0.445)**	**(0.441)**
lnTA	**0.205****	0.202**	**0.162****	**0.161****
	(0.082)	(0.097)	**(0.075)**	**(0.075)**
lnHHII	**0.615***	0.894**	0.58	**0.647***
	(0.353)	(0.441)	(0.393)	**(0.375)**
OWNS	0.042	0.081	0.039	-0.029
	(0.218)	(0.246)	(0.217)	(0.209)
Loan growth	-	0.466	0.316	0.350
		(0.354)	(0.394)	(0.410)
GDPGR	0.036	-	0.022	0.024
	(0.27)		(0.027)	(0.025)
GDPGr squared	-	-	-	-0.003
				(0.005)
INF	**0.144***	**0.197****	**0.138***	**0.149***
	(0.078)	**(0.083)**	**(0.077)**	**(0.087)**
Constant	**-8.077*****	**-10.142*****	**-7.432****	**-7.947****
	(2.87)	**(3.448)**	**(3.098)**	**(3.089)**
Number of obs	459	429	473	473
AR(2)	0.486	0.46	0.729	0.617
Hansen Test	0.126	0.118	0.127	0.181

Table 8– Determinants of profitability (ROE) of SEE small commercial banks ROE

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Dep var (-1)	0.117	**0.167***	**0.193***	**0.243****
	(0.117)	**(0.088)**	**(0.104)**	**(0.105)**
lnEQAST	**8.59***	**13.019****	6.540	**11.684*****
	(5.03)	**(5.295)**	(4.886)	**(3.716)**
lnLLPTL	**-5.834*****	**-5.741****	**-5.332*****	**-4.143****
	(1.603)	**(2.213)**	**(1.479)**	**(1.679)**
lnCI	**-27.027*****	**-29.681*****	**-26.926*****	**-28.208*****
	(11.738)	**(7.512)**	**(7.292)**	**(5.392)**
lnTA	4.47	4.289	2.555	**4.830***
	(2.729)	(2.705)	(3.928)	**(2.653)**
lnHHII	-2.604	4.122	-2.979	-1.233
	(5.282)	(6.49)	(4.555)	(6.546)
OWNS	**6.061****	**4.47***	2.875	**4.112***
	(2.682)	**(2.519)**	(3.326)	**(2.334)**
Loan growth	-	2.258	1.649	1.354
		(2.122)	(1.964)	(1.664)
GDPGR	**0.642****	-	**0.597****	**0.842****
	(0.295)		**(0.293)**	**(0.317)**
GDPGr squared	-	-	-	**-0.104****
				(0.052)
INF	0.964	0.881	0.096	-0.069
	(1.666)	(0.963)	(0.877)	(0.979)
Constant	-32.029	-75.425	-21.618	-81.415
	(43.916)	(62.385)	(86.848)	(32.072)
Number of obs	75	59	77	59
AR(2)	0.323	0.549	0.399	0.307
Hansen Test	0.788	0.963	0.906	0.998

Table 9 - Determinants of profitability of SEE (ROE) of large commercial banks ROE

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Dep var (-1)	**0.92****	**0.904****	**0.913****	**0.994****
	(0.384)	**(0.461)**	**(0.387)**	**(0.452)**
lnEQAST	**9.007****	**8.412***	**9.747****	**9.007****
	(4.475)	**(4.876)**	**(4.826)**	**(4.229)**
lnLLPTL	**-5.974*****	**-4.723*****	**-4.163****	**-4.040****
	(1.978)	**(1.524)**	**(1.606)**	**(1.541)**
lnCI	-1.115	**4.125***	-3.915	**-4.043***
	(2.314)	**(2.326)**	(2.447)	**(2.399)**
lnTA	-0.131	-0.044	0.677	-0.107
	(1.103)	(1.118)	(1.144)	(1.106)
lnHHII	-1.692	**-2.151****	-1.682	-3.604
	(4.303)	**(5.801)**	(4.219)	(4.612)
OWNS	-2.403	-3.12	0.672	-2.933
	(3.631)	(3.321)	(5.534)	(3.445)
Loan growth	-	**10.357****	**10.119***	**9.221****
		(4.248)	**(5.472)**	**(4.695)**
GDPGR	**0.834*****	-	**0.558****	**0.533****
	(0.155)		**(0.214)**	**(0.229)**
GDPGr squared	-	-	-	-0.049
				(0.043)
INF	-0.953	-1.131	-0.771	-1.617
	(0.724)	(1.361)	(0.561)	(1.008)
Constant	8.007	9.252	3.462	-25.048
	(34.276)	(47.756)	(32.179)	(37.115)
Number of obs	271	244	271	244
AR(2)	0.306	0.2	0.340	0.198
Hansen Test	0.229	0.494	0.406	0.577

6. Conclusions

In this study, we investigated the determinants of banks' profitability in the SEE region. Our findings lend support to the following results. First, some banks' specific variables like total assets and loan loss provisions usually have a larger impact on Banks's profitability in comparison to other banks' specific variables. Secondly, the effect of macroeconomic variables is also usually statistically significant therefore highlighting the impact of macroeconomic conditions on banks' performances. Splitting the sample into small and large banks, we found that the determinants of banks' profitability have a larger effect on small banks in comparison to large banks irrespective of the profitability measures used in the analysis. Secondly, macroeconomic variables, as determinants of banks profitability, have an effect larger on large banks in comparison to what we observe in the case of small banks. Furthermore, we found evidence that ownership usually affects profitability of small banks while the effect is not statistically significant when we consider large banks. This implies the former, when ownership is mainly domestic, perform at a level which is lower than what we observe when their ownership is foreign. Policy implications of this study are that SEE profitability of small banks is much more sensible than what we observe in the case of large banks. Therefore, profitability for the former tends to be more volatile and less certain. Consolidation with major or other small banks would increase small banks size and benefit from economies of scale, as well as the adoption of new technologies and management skills.

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