Bank profitability and impact of the great recession

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Abstract

A well-functioning banking industry ensures strong credit conditions which are the basis for business investment and economic growth. Moreover, it mitigates the possibility of facing the detrimental repercussions arising from the sovereigndebt-banking nexus. This paper investigates internal and external factors affecting banks' performance by bringing an international perspective. The analysis covers an 18-year period (2000-2017) and builds on 432 bank-year observations. Generalized Method of Moments (GMM) regression employs data obtained from banks' financial statements while the macroeconomic indicators are retrieved from World Bank. Empirical findings indicate moderate levels of profit persistence and competition in the banking sector. Credit risk is found to depress profitability, while income diversification and strong capitalization lead to better financial performance. As far as the external factors are concerned, only GDP seems to be significant but of little impact. On the other hand, sub-prime crisis' dummies appear to be statistically insignificant in a global scale. This research is of interest for bank management, bank supervisory authorities, and financial system as a whole.

Keywords: Bank Profitability, The Great Recession, GMM, ROAA.
JEL Classification:C23; G21

1. Introduction

Banking sector plays a crucial role in the real economy and economic growth. A stable and well-functioning financial system allocates funds to the most productive use, thus supporting new investments, creating employment opportunities and laying the foundations for growth. In Albania and most European countries, reliance on bank lending is heavy. The main medium of raising capital for firms in these countries (Continental Europe and Japan) is bank borrowing. If lending channel fails to work properly, firms are left for the most part with no option but cancellation of their projects, hence adversely affecting the real economy (Dell'Ariccia, Detragiache&Rajan, 2008). Nevertheless, the role of banks in financing business start-ups and expansions remains vitaleven in developed economies. If bank system undergoes times of distress, soon enough economic activity contracts making the matters worse. Latest evidence in support of the previous statement comes from Great Recession. What started as a banking crisis soon became a global recession bringing sovereign countries on the verge of collapse.

Given the irreplaceable importance of banks, the existing literature on bank profitability is extensive. The study which set the foundations of current knowledge on this topic comes from Demirgüç-Kunt and Huizinga (1999). They were among the first authors to perform a comprehensivecross-country analysis. Authors found that inflation, interest rates and capitalization are important for increased profitability. On the other side, the volume of non-earning assets and reserves appeared to hurt banks' bottom-line.

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Other authors used different regressors and sometimes different methods to shed some light on this issue. Differences aside, studies on bank performance have several features in common: Bank profitability is expressed as a function of two major groups of factors (internal and external); ROA (return on assets) and ROAA (return on average assets) are considered the best measures of banks' financial performance (Golin,2001); NIM (net interest margin), ROE (return on equity) and ROAE (return on average equity) are employed in regression models of secondary focus; fixed effect model prevails among researchers despite its weaknesses (failure to account for endogeneity and profit persistence).

This paper examines the effect of bank-specific and macroeconomic indicators on banks' financial performance. The pool of chosen factors includes: size, credit risk, branch networks, leverage, loan intensity and cost efficiency from the former group along with inflation and GDP from the latter. In addition, the equation comprises time dummies so as to check whether or not the Great Recession had a statistically significant impact on banking sector. This study brings an international perspective by using a sample of 24 banks located across the globe. Moreover, it employs dynamic GMM which accounts for endogeneity in capital variable as well as profit persistence. Through a long-term coverage (2000-2017) and considerable sample size (432 bank-year observations) we try to draw conclusions which are essential for day-to-day decision-making process of bank management, supervisory authorities' policy-setting and financial system as a whole.

The rest of the paper is organized as follows: Section 2 reviews the current literature; Section 3 presents the methodology while Section 4 focuses on the Empirical Results. Findings are shown in Section 5 and the final conclusions are summarized in Section 6.

2. Literature Review

Determinants of bank profitability have been widely investigated by researchers. Based on the current knowledge in the field, it could be said that bank profitability is a function of internal and external factors. External determinants are out of bank control. Generally, such factors are determined by the legal and economic environment where the bank operates as well as by other competitors in the same market. On the other hand, bank has full control on internal factors. Typically, bank management influences internal factors based on business strategy and specific targets for the period.

The vast majority of papers find that internal factors are crucial for banks' profitability thus deserving particular attention. Athanasoglou, Brissimis and Delis (2008) examined internal and external determinants of bank profitability in Greece. Authors account for the inappropriateness of majority of previous research in the field by employing GMM (General Method of Moments). Using unbalanced panel data from Greek commercial banks during 1985-2001, Athanasoglou et al. concluded the following: credit risk and operating expenses exert negative impact on bank profits while labor productivity growth enhances profitability. Dietrich and Wanzenried (2011) go along similar lines. Authors conducted a study on commercial banks in Switzerland and the impact of the Great Recession on Swiss banking system. Relying on GMM estimation method they were able to find a positive effect of cost efficiency on bank profitability. The importance of burden management is stressed also by: Sufian and Chong (2008); Curak et al. (2012);Garcia and Guerreiro (2016). In addition, Dietrich and Wanzenried linked heavy reliance on interest income and higher funding costs with lower levels of profitability while above average loan volume growth resulted to

increase ROAA (return on average assets). Similarly, Sufian and Habibullah (2009) found that loan volume plays a positive role in profitability enhancement.

With respect to capitalization levels, we see that researchers have come to no agreement. In some cases, higher capital is linked with lower funding costs and higher buffer against illiquidity and/or insolvency. Such connection suggests that capital contributes to better performance. Studies from: Vong and Chan (2009); Sufian and Habibullah (2010); Sinha and Sharma (2016) support this argument. On the other hand, there are researchers who claim that higher levels of capital hint at over-cautious business strategies which eventually hurt profits. Among proponents of this view are: Curak et al. (2012) and Saona (2016).

Another frequently analyzed factor is deposits' volume. Once more we see that current literature brings inconclusive results. Several authors have found that deposits are positively related to banks' performance. The reasoning behind this finding is that deposits comprise a low-cost funding source when compared to other mediums that banks use to raise the necessary funds. Nevertheless, not all authors agree with such logic. Authors of the opposing group lay emphasis on the type of deposits. If banks have a considerable amount of non-core deposits on their balance sheet, huge interest payments and unpredictability of such volatile funds can bring detrimental effects on banks' bottom line. Banks must be prepared to not only give high rates of interest for such deposits, but also to lose them any time a better rate is offered by a competitor bank. Gul et al. (2011) found that deposits are important for increased profitability levels, yet findings related to this variable are inconsistent among different authors.

Despite the exhaustive research on banks' profitability determinants, impact of size remains ambiguous. Some authors believe that "Economies of Scale" hypothesis applies in banking industry; others oppose such claim. The former group claims that as size increases, benefits from both economies of scale and scope rise; banks start implementing best practices and increasing their expertise; all leading to higher profitability levels (Gul et al.,2011; Anbar and Alper, 2011; Andrieş, 2016; Ashiku and Gërdani, 2017). Contrary to such arguments, the latter group of researchers argues that with the increase in size, banks' burden rises to an extent that it outweighs any potential benefits, thus lowering profitability and financial performance (Pasiouras and Kosmidou, 2007; Ben Naceur and Goaied, 2008; Sufian and Habibullah, 2010; Căpraru and Ihnatov, 2014; Numani et al., 2017).

Next, we present the role of external factors in banks' success. Gross Domestic Product is used by researchers as a proxy for business cycle. Numerous authors consider banks' profitability to be procyclical. For instance: Căpraru and Ihnatov (2014) along with Curak et al. (2012) found a positive relationship between GDP and bank performance. Yet, other researchers have come up with conclusions which contradict the above-mentioned ones. Staikouras and Wood (2004), Garcia and Guerreiro (2016), Shingjergji and Zaho (2017) assure counter-cyclical patterns in banks' performance. Inflation is used along with GDP as a proxy for business cycle. As far asinflation is concerned, it can be said that predictability plays a crucial role. If banks' management, due to Information Asymmetry, adjusts interest rates accordingly in response to expected inflationary pressures bank benefits. The contrary happens when banks face unexpected inflation. There is a vast number of authors who investigate the role of inflation on profitability: : Demirgüç-Kunt, A., & Huizinga, H. (1999); Sufian, F., & Chong, R. R. (2008); Sufian, F., & Habibullah, M. S. (2009); Vong, P.

I., & Chan, H. S. (2009); Kanas, A., Gul, S., Irshad, F., & Zaman, K. (2011); Vasiliou, D., &Eriotis, N. (2012); Ashiku, M., &Gërdani, D. (2017), Shingjergji.A, &Zaho,L. (2017).

3. Methodology

The main objective of this paper is the investigation of determinants of bank profitabilityover the time interval 2000-2017.As far as the choice of the econometric method is concerned, GMM is used to carry out our analysis. The reasons behind such choice are related to the advantages that this method exhibits when compared to fixed effects or random effect model. While the former accounts for profit persistence, a phenomenon quite common in the banking industry, and for endogeneity problem as well; the latter fall behind in the above-mentioned aspects. Reliance on fixed- or random-effect model in the conditions of incorporating lagged dependent variable (so as to check for profit persistence) would yield inconsistent and biased results. Moreover, based on what common-sense, literature and econometric tests suggest capital variable is a source of endogeneity in the model. The higher the capitalization levels, the more opportunities banks have to expand their products and services. That said, even though one product/service temporarily faces a decrease in demand, others offset such decline thus enabling the bank not only to reduce risk but also to maintain good profitability levels. On the same note, as profitability levels increase bankstend to accumulate a proportion of the annual profit in retained earnings' account. Such actions cause owners' equity, in other words capitalization of the bank, to increase. All considered we decide to deal with endogeneity problemby employing GMM in the estimation of our regression equations.

Data employed in the estimation of the regression equations is of a quantitative nature. To account for the crisis' years, two dummies are generated and included besides other explanatory variables. The first dummy variable accounts for the first stage of the crisis (is equal to 1 if the observation belongs to the period 2007-2009, subprime crisis' period; and equal to 0 otherwise). The next dummy variable stands for the second stage of the crisis (it equals 1 if the observation belongs to the period 2010-2012; in short, years during which US sub-prime mortgage crisis turned into a global financial crisis).This paper uses an unbalanced panel data set over a period of 18 years (2000-2017) toprovide some international perspective on banking sector worldwide. The data set does not contain only bank-specific variables (internal variables) but it also contains macroeconomic variables (external ones). Bank-specific variables consist mainly of financial ratios capturing different aspects of bank profitability. The figures for such ratios are obtained using financial statements (balance sheet, income statement and annual reports) accessible via the individual website of each bank. With regard to external macroeconomic factors, i.e. inflation level and GDP, these ones are retrieved from World Bank's database. Sample banks included in the study are selected based on their size as measured by the monetary value of total assets of each individual bank. Top four banks from America, Africa, Asia, Europe, Australia and lastly Albania (domestic case) comprise our sample of 24 banks. Overall, we had a total of 432 bank-year observations.

Based on the existing literature on the issue, we can state that bank profitability is a function of internal (bank-specific) factors and external (macroeconomic and industry-specific) factors. Researchers mostly rely on one of the following financial ratios, as dependent variable to capture bank performance. Below we provide some arguments on the pro-s and con-s related to the each of these ratios (ROA, ROE, NIM).

ROE (Return on Equity) is a financial ratio belonging to the group of profitability ratios. It shows the ability of management to effectively use owner's investment in ensuring earnings' growth. This ratio is computed by dividing net income/net loss by the total equity. An alternative way of measuring ROE is by multiplying ROA by EM (equity multiplier). As EM rises, the ratio of total assets to total equity rises as well indicating higher use of financial leverage. Logically, we expect that the higher the financial leverage, the higher the risk of illiquidity/insolvency is. That said, ROE seems to be somehow misleading because it automatically increases with the rise of EM, despite the fact that such thing can prove harmful to sustainable performance of the bank.

NIM (Net Interest Margin) is another profitability ratio derived by initially deducting interest expense from interest income and then dividing the difference by the total interest-earning assets (NIM = {II – IE}/ Average Interest-Earning Assets). The main drawback of this ratio relates to the fact that it provides information only on the contribution of interest-related activities to the bank's profits. Years ago, asset transformation used to be the foundation of bank operations. As this industry evolved, the scope of activities exponentially increased and with it came the ever-increasing contribution of fee income to bank profits. Nowadays, banks offer everything from: advisory services, property evaluation, life insurance, property insurance, foreign currency exchange and so on. Under such circumstances, it would be inappropriate to account only for II and disregard the monetary contribution of OI (non-interest income) to bank's bottom line.

ROA (Return on Assets) is a profitability ratio indicating the management effectiveness on using assets to generate profits. Another way to explain ROA is by using its computational procedure. In short, it shows the additional net income generated out of each $ of assets. The proponents of this measure are numerous. Many researchers use ROA as dependent variable when investigating bank performance, among whom: Anbar&Alper(2011); Ben Naceur&Goaied (2008); Sufian, & Habibullah (2010). Furthermore, the literature suggests that ROA is the most effective measure for bank profitability (Golin, 2001).

After weighing all the advantages and disadvantages of each measure, we use in this paper ROAA as a measure of primary importance and ROAE in a supporting role. ROAA is used instead of ROA, as the former accounts for the fact that assets are a permanent balance-sheet account and thus carried from one year to the next. The same explanation applies to the choice of ROAE over ROE.

The regression model employed in this paper builds on several explanatory variables capturing internal and external determinants of banks' financial performance. In this paragraph a detailed description of each proxy is provided so as to give useful information about the expected logical impact of each independent variable on the performance measure (ROAA, ROAE).

Bank size is the first independent variable used to estimate bank profitability. Natural logarithm of total assets of each bank (LN__OF_TOTAL_ASSETS) is used as a proxy for bank's size. In fact, the relationship between size and performance is highly controversial. Based on the existing literature, it can be said that "economies of scale" hypothesis has not always proven to apply in the banking sector. Despite this fact, its proponents are numerous: Gul, Irshad, & Zaman, (2011); Andrieş, (2016); Anbar&Alper (2011). On the other hand, there is a long list of opponents of economies of scale in banking industry. Amongst authors

who have found a negative impact of size on profitability of banks are: Sufian& Habibullah (2010), Căpraru&Ihnatov(2014); Ben Naceur&Goaied (2008); Pasiouras&Kosmidou (2007); Numani, Korbi&Xhafa (2017). As we see the inconclusive results of previous researchers, we are quite unsure about the expected sign of this variable. It seems that banks of higher size could either use it effectively to increase the volume of services/products and benefit from diversification (income and asset diversification), or their profitability levels can considerably decrease as size goes beyond some optimal levels.

The second explanatory variable used in the regression is credit risk. Credit quality is an important factor for bank's bottom line considering the huge volume of loans that banks extend on a regular basis. Undertaking a careful preliminary check on potential borrowers coupled with an ongoing monitoring and supervision can make the difference between success and failure; so we include as a proxy for credit risk the ratio of loan loss provisions to total loans (PLL___TOTAL_LOANS). In line with common sense, current literature and economic knowledge we expect an indirect relation between this variable and our performance measure. All researchers have consistently stated that credit risk is one of the most severe risks faced by banks which depresses bank profitability: Athanasoglou, Brissimis & Delis (2008);Sufian& Chong (2008); Sinha& Sharma(2016);Staikouras& Wood (2004);Vong& Chan (2009);Petria, Capraru&Ihnatov(2015);Shingjergji&Zaho (2017);Numani, Korbi&Xhafa (2017).

Banks are well known for their primary function of asset transformation. This process consists of banks accepting deposits and using a part of them to extend loans. That said, we use 'branch networks' as the next explanatory variable in our model. The proxy for this independent variable is natural logarithm of total deposits (LN_OF_TOTAL_DEPOSITS). Based on economic knowledge, we can say that deposits affect directly the profit margin of banks. While the money obtained through deposits is relatively cheap for banks, other sources of bank funding can be quite costly thus shrinking the profitability levels. Gul et al. (2011) go along similar lines. Nevertheless, this is not always the case. If we consider volatile deposits, otherwise known as non-core deposits, then we need to emphasize two major problems that they bring to banks and their profitability level. To start with, these deposits require high interest payments hence posing a detrimental impact on interest expense account. Moreover, they are unreliable in the sense that they immediately leave the bank once offered a better deal (higher interest rate). In such circumstances, we are not able to precisely predict the sign of the coefficient of total deposits.

Leverage is another important variable in the estimation of bank profitability. Equity-to-asset ratio (TE___TA) is used in our model as a proxy for bank's leverage. The direction of impact from this variable to performance measure seems to be ambiguous. On one side, strong capitalization means higher confidence amongst lenders on the creditworthiness of the bank. All this is translated in easier access to low-cost funding and better profit margin. On the other side, higher capitalization levels could infer that the bank is overcautious and is failing in exploiting potentially profitable opportunities. The controversial nature of this variable is also seen when analyzing the existing papers. Hoffmann(2011) and Curak et al. (2012) report an inverse relationship between capitalization and profitability in banking industry. Contrary to their findings: Bourke (1989); Demirgüç-Kunt& Huizinga (1999); Sufian& Chong (2008);Vong& Chan (2009); Sufian& Habibullah (2010); Căpraru&Ihnatov(2014); Andrieș(2016); Sinha& Sharma (2016); Ashiku&Gërdani (2017);

Amahalu et al. (2017), state that higher capitalization levels are beneficial for banks' financial performance.

Financial performance of banks is also expected to hinge on loan intensity. Traditionally, this sector revolved around two main operations: deposit acceptance and lending. Having said that, we include the ratio of total loans to total assets (LOANS___TA) as a proxy for loan intensity. It is expected that such variable is positively related to profitability, since interest income is a major source of cash-inflows for banks. Provided that loan applications undergo a careful screening and evaluation of the creditworthiness of the potential borrower their contribution to the profit level is positive and considerable in terms of magnitude. Results of a consistent direct relationship are numerous in the existing literature: Dietrich&Wanzenried (2011), Garcia &Guerreiro (2016), Sufian& Habibullah (2009), Ben-Naceur&Goaied(2008), Gul et al. (2011).

Cost efficiency otherwise known as burden management is a major concern for banks. Sometimes the burden is so huge that it significantly deteriorates the bank's bottom line. To account for such variable, we include in the model two financial ratios which serve as proxies. The first one is the ratio of non-interest income to total assets (OI___TA) and the second presents non-interest expense as a fraction of total assets (OE___TA). As the range of operations of banks is becoming wider and wider, non-interest income is occupying an ever-increasing proportion of profits. On the other hand, the aim is still to bring the burden as close as possible to an optimal level. In view of the foregoing, we expect OI___TA to be positively related to performance measure and OE___TA to be inversely related to ROAA and/or ROAE. The positive role of income diversification is evidenced in several papers including the following: Sufian& Chong(2008) and Numani et al. (2017). In contrast, OE is found to depress bank profits: Athanasoglou et al. (2008) and Numani et al. (2017).

Research has shown that the role of macroeconomic factors is not of the same importance with that of the internal ones when it comes to bank profitability. Despite this fact, there are several determinants, out of banks' control, which are found to be statistically significant in shaping bank profits. Factors such as GDP or inflation are among the main indicators of the macroeconomic environment in a given country. That said, we include this two (LN_GDP_ and INFLATION) in our regression to capture the external forces that affect banks' performance.

As current literature shows, the impact of these two factors on financial performance of the banks remains ambiguous. Some authors claim that GDP and ROAA/ROAE are inversely related: Garcia&Guerreiro (2016);Staikouras& Wood(2004);Shingjergji&Zaho (2017). Notwithstanding, there are several papers that support the existence of a positive correlation between GDP and performance measures: Gul et al. (2011); Curak et al. (2012); Căpraru&Ihnatov(2014).

The former group of authors advocates the idea that when GDP increases, economy expands and business flourishes. Under such circumstances, banks foresee a considerable increase in the demand for loans used to fund new investments. Given such favorable conditions to expand the loan portfolio, banks become subject to a fierce competition for borrowers. In this attempt to attract more and more borrowers, they shrink their margins so as to benefit the situation. Such action, while might indeed expand the loan portfolio with good-quality loans will hurt the bottom line due to lower interest rates being charged for the debt.

On another note, there is a good number of proponents of pro-cyclical profitability in the banking sector. This group supports the idea that when economy is booming everyone is somehow better off, thus creditworthiness is improved for any typical individual. If the bank is faced simultaneously with an increase in demand for loans and with an overall higher credit score of its customers, its chances of improving the financial position are greater. Faced with such contradicting results, we are quite unsure about the expected sign of GDP.

Based on the current knowledge in the field, it seems that same uncertainty prevails when trying to predict the role of inflation on banks' performance. Even though this macroeconomic indicator is widely seen in the regression models used by researchers, the direction of influence seems to vary with the selected sample/methods/case countries. Our proxy of inflation uses changes in CPI (consumer price index) applied through Laspeyres formula.

With respect to the relationship that holds between inflation and performance measure, we can say that proponents of a positive relationship are numerous: Demirgüç-Kunt& Huizinga(1999); Sufian & Habibullah (2009); Vong& Chan (2009); Kanas et al. (2011); Vasiliou & Eriotis (2012); Ashiku&Gërdani(2017). These authors explain such results based on expectations about the future. If inflation is fully anticipated, banks are likely to have the necessary time to effectively adjust interest rates so as no losses arise.

On the other side, banks would hardly make an effective interest rate adjustment if faced with some unexpected inflationary pressures. In short, predictability of inflation is the cause of differences in results. For instance, a second group of authors finds a negative impact of inflation on banks' performance. Amongst such authors are: Sufian& Chong(2008), Sufian& Habibullah(2009); Sinha& Sharma (2016);Shingjergji&Zaho (2017).

The last two explanatory variables included in the model aim to control for the impact of sub-prime mortgage crisis on banking sector. Since literature divides this crisis into phases, we generate two dummies: one for each stage of the Great Recession. While the first dummy variable denotes the period between 2007-2009, namely the first stage of the crisis; the second dummy variable denotes the second stage of the recession 2010-2012. The idea behind dummy inclusion is to test whether or not the crises had a statistically significant impact on a global-level.

The basic descriptive statistics for all variables included in the regression model are displayed and described in this subsection. Elements such as: standard deviation, arithmetic mean, minimum and maximum value are shown in Table1. Table2 presents the variables included in the regression; proxies used to represent each; as well as their expected signs.On average, our sample banks have a ROAA very close to 1% (precisely 0.92%) and a ROAE equal to 13.37% over the studied period 2000-2017. Historically speaking such figures for profitability ratios indicate good performance of banking industry. Variability of ROAA seems to be low (0.57%) when compared against 8.05% of ROAE.The rationale behind these values relates directly with financial leverage. It seems that some banks rely heavily on financial leverage while others try to keep it under moderate levels, thus following a more cautious approach when doing business. The best financial performance is achieved by Agricultural Bank of China in 2005, when this bank reached a ROAA of 2.39%. Contrary to this successful performance, Raiffeisen Bank Albania achieved its worst levels of ROAA in 2016 with a negative return of -1.5%.Capitalization ratio seems to be about 7% with a variation of 2.55%. The highest degree of capitalization is reached by China Construction Bank in 2009 (equal to 19.61%) yet the same bank seems to have been way behind in terms

of capitalization in 2000 with only 1.45% in owners' capital. For the typical bank in our sample LN__OF_TOTAL_ASSETS equals 14.85, with 2.24 in standard deviation and a maximum and minimum of 22.02 and 11.9 respectively.With regard to LN_OF_TOTAL_DEPOSITS, this variable has a maximum of 21.77 and a minimum of 11.40. On average it equals 14.38 with a standard deviation of 2.39. The proxy of loan intensity ranges from only 0.31% to 86.44%. For the most part, banks have 51.49% of their assets occupied by loans along with a standard deviation of 16.98% which is quite large. Such values suggest that some banks prefer to diversify their assets, thus relying not only on loans but on other interest-earning assets as well. On the other side, there are banks who follow the "traditional trend" thereby being quite aggressive in lending volume. The ups and downs in loan business relate also to credit conditions; if the bank notices a deterioration in its assets' quality, it will tend to contract its loan portfolio and become extremely prudent when considering new loan applications. The next two proxies are related to cost efficiency and income diversification. Both ratios show a standard deviation close to 2% and reach a maximum value of about 29.9%. In general, the ratio of non-interest expense to total assets (OE___TA) is 2.08% while the ratio of non-interest income to total assets (OI___TA) is 1.62%. Such figures call for extra caution by banks' management. It seems that on a global scale non-interest income is in the best-case scenario offset by the non-interest expense, while typically it seems that non-interest expense outweighs any positive contribution of fee income for banks profitability. This situation can be explained by huge costs incurred by banks worldwide on educated personnel and cutting-edge technology. The average of PLL___TOTAL_LOANS is approximately 1% with a high variability of 1.58%. The peak for such ratio is at 18.48% while the bare minimum is at 0.03%. In this regard, we can infer that credit risk exposure varies widely amongst banks. While some banks are successful in minimizing losses due to bad credits, others are facing major problems due to delinquencies or write-offs. As regards the macroeconomic indicators, inflation has a maximum of 10% and a minimum of -0.73% (deflation), while LN__GDP ranges from 22.12 to 30.67. For the greatest part of observations, inflation takes values close to 2.84% (which is quite close to what is considered to be the target or optimal rate) with a standard deviation of 1.83%, while LN__GDP is on average 28 and presents a low variability of about 2.48.

With respect to multicollinearity assumption, we present next a correlation matrix which shows the correlation coefficient for each pair of explanatory variables. As Table 3 depicts, the only problem is the high correlation between deposits and total assets. Given that we use GMM to estimate our regression equation; such correlation is of no concern. GMM yields reliable and accurate results even under high correlation values between independent variables (see Baltagi,2001).

Table1

Variables and Their Expected Signs

Variable	**Proxy**	**Expected Sign**
Bank Size	Ln (Total Assets)	Mixed Results
Credit Risk	Loan Loss Provisions / Total Loans	Negative
Branch Networks	Ln (Total Deposits)	Mixed Results
Financial Leverage	Equity / Total Assets	Mixed Results
Loan Intensity	Total Loans / Total Assets	Positive
Income Diversification	Non-Interest Income / Total Assets	Positive

Burden Management	Non-Interest Expense / Total Assets	Negative
Business Cycle	Ln (Gross Domestic Product)	Mixed Results
Business Cycle	Inflation Rate	Mixed Results

Table 2

Descriptive Statistics of the regression variables

	Mean	Maximum	Minimum	Std. Dev.
ROAA	0.0092	0.0239	-0.0150	0.0057
ROAE	0.1337	0.3779	-0.2171	0.0805
TE___TA	0.0712	0.1961	0.0145	0.0255
Inflation	2.8401	10.0553	-0.7320	1.8693
LN__GDP	28.0032	30.6779	22.1246	2.4830
LN__OF_Total_Assets	14.8513	22.0206	11.9028	2.2403
LN_OF_Total_Deposits	14.3858	21.7769	11.4075	2.3996
LOANS___TA	0.5149	0.8644	0.0031	0.1698
OE___TA	0.0208	0.2997	0.0002	0.0215
OI__TA	0.0162	0.2999	-0.0005	0.0203
PLL___Total_Loans	0.0101	0.1848	0.0003	0.0158

Table3

Correlation Matrix of the regression variables

	TE/ TA	Inflation	Ln (GDP)	Ln (TA)	Ln (TD)	Loans/ TA	OE/ TA	OI/ TA	PLL/ TL
TE/TA	1								
Inflation	*(0.00)*	1							
Ln(GDP)	*(0.12)*	*(0.28)*	1						
Ln(TA)[2]	0.25	*(0.18)*	*(0.44)*	1					
Ln (TD)[3]	0.27	*(0.15)*	*(0.49)*	0.98	1				
Loans/TA	0.14	0.29	*(0.16)*	*(0.36)*	*(0.30)*	1			
OE/TA	0.16	0.10	0.02	*(0.14)*	*(0.11)*	*(0.01)*	1		
OI/TA	0.05	0.13	0.04	*(0.20)*	*(0.18)*	0.04	0.25	1	
PLL/TL	0.10	0.04	*(0.05)*	*(0.09)*	*(0.09)*	*(0.02)*	0.06	0.10	1

[2] Natural Logarithm of Total Assets for each of the sample banks

[3] Natural Logarithm of Total Deposits of each of the sample banks

All numbers on Table 3 presented in italics and inside parenthesis are negative.

4. Results and Discussions

To fulfill the purpose of investigating internal and external determinants of bank profitability in a global scale, this paper employs a dynamic linear regression model as shown below:

$$Y_{it} = \alpha_{it} + \beta_{it}*X_{it}+\delta_{it}*Z_{jt}+ \gamma*Y_{(i,t-1)}+ \varepsilon_{it}$$

In the model presented above, α, ε, X, Y, and Z denote respectively: the constant term (intercept) (α); the normally distributed disturbance term (ε_{it}); the internal (bank-specific) variables (X); the performance measure (ROAA or ROAE) of bank *i* for the year *t* (Y_{it}); the external (macro-economic) indicators (Z) for each country/territory *j*.

The main reason for the estimation of a dynamic model relates to the phenomenon of profit persistence. In banking industry such phenomenon is widely discussed as it captures competition levels prevailing in the sector. With that said, our regression model includes the first lag of the dependent variable thus allowing us to make inferences on the speed of adjustment to equilibrium (γ). A coefficient of the lagged performance measure close to 1 indicates poor levels of competition and low speed of adjustment. On the other side, values close to 0 denote a competitive industry with high adjustment speed. Lastly, the regression is estimated using heteroscedasticity-robust standard errors so as to mitigate any potential heteroscedasticity issues. As mentioned earlier, the estimation method is GMM.

It is of utmost importance to make sure that estimates of the regression model are consistent and unbiased at the same time. In consideration of the foregoing, we run the following preliminary tests to ensure that all assumptions/conditions are duly met and all issues are addressed accordingly. In the first place, we need to pay particular attention to potential non-stationary behavior of our variables. We rely on the Fisher test, null hypothesis being in favor of the existence of a unit root, to check for non-stationarity of our unbalanced panel. At a significance level of 5% (and consequently at 10% as well), we are able to reject the null, thus arriving at the conclusion of no unit root. Given these satisfactory results, the problem of spurious regression cannot be a concern in our model.

Table 4

Test on Stationary Behavior of Regression Variables

Method	**Statistic**	**Prob.****
Null: Unit root (assumes common unit root process)		
Levin, Lin & Chu t*	-1.9033	0.0285
Null: Unit root (assumes individual unit root process)		
Im, Pesaran and Shin W-stat	-12.411	0
ADF - Fisher Chi-square	301.959	0
PP - Fisher Chi-square	749.11	0

Another aspect taken into consideration is the choice of the appropriate estimation method which accounts for the presence of the lagged dependent variable, yet giving consistent and unbiased estimates. We addressed to this issue by employing GMM over a

large time span of 18 years. Under these conditions, we mitigate any possibility for inefficient GMM estimators due to the fact that the time period used in this paper is large enough (2000-2017).

Next, we need to assess if capital is better modeled as endogenous vs. exogenous variable. Knowing that theory and common sense combined suggest that capital is endogenous, we run a test to check whether this is the case in our data sample. Results from Endogeneity Test suggest that capital is better modeled as endogenous, so we use its first lag as instrumental variable. Table 5 presents the test results and P-value obtained, thus supporting our reasoning at 95% confidence level in which we have enough evidence to reject the null hypothesis of exogeneity.

Table 5
Endogeneity Test of Capital Variable

Endogeneity Test
Null hypothesis: TE___TA is exogenous

Specification: ROAA TE___TA LN__GDP_ OI__TA PLL___TOTAL_LOANS ROAA (-1) C

Instrument specification: C TE___TA (-1) LN__GDP_ OI__TA PLL___TOTAL_LOANS ROAA (-1)

Endogenous variables to treat as exogenous: TE___TA

	Value	df	**Probability**
Difference in J-stats	4.240925	1	0.0395

The last thing we considered is the inclusion of time dummies so as to account for crisis impact. We generated two dummies (one for each phase of the Great Recession: 2007-2009 and 2010-2012). These dummies appeared to be individually insignificant (at 1, 5, 10%), so we dropped them from the model thus mitigating the Irrelevant Variable Bias Problem.

We follow the General-to-Specific approach which allows us to obtain the optimal model only after having estimated the unrestricted equation with the full set of explanatory variables. We omit one-by-one all statistically insignificant independent variables which leaves us with six regressors to be used in interpreting banks' financial performance.

Table 6 shows the estimation output of our primary model with ROAA as dependent variable. Next, we present the results from GMM equation with ROAE as dependent variable. As mentioned above, the output included in the paper comprises only significant regressors. Throughout the paper, specific importance is given to the model with ROAA as dependent variable since it is considered the best performance measure up-to-date. To complement the analysis, equationwith ROAE as dependent variable is estimated likewise since this variable is crucial for shareholders and their decision-making process. See Table 7 for the exact coefficients.

To make sure that our estimates are consistent, we check for first- and second-order autocorrelation AR (1) &AR (2) by running a test on residuals. According to Arrelano and Bond, second order correlation of residuals brings inconsistency of estimators. Based on P-value, we determine that autocorrelation is not present so our estimation output is considered robust.

Table 6
GMM Estimation output with ROAA – Global Scale

Dependent Variable: ROAA Standard errors computed using HAC covariance method				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
ROAA (-1)	0.578487	0.068478	8.447726	0.0000
LN_GDP	-0.000398	0.000122	-3.26114	0.0012
OI_TA	0.049212	0.019286	2.551657	0.0111
Pll_Total_ Loans	-0.057245	0.027291	-2.09759	0.0366
TE_TA	0.016414	0.012677	1.29478	0.1962
Intercept	0.013664	0.003663	3.730329	0.0002
R-squared = 0.546614		**Adjusted R^2:** 0.540772		

Table 7
GMM Estimation output with ROAE – Global Scale

Dependent Variable: ROAE Standard errors computed using HAC covariance method				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
ROAE (-1)	0.562208	0.053029	10.60185	0.0000
TE___TA	-0.315002	0.182237	-1.71285	0.0847
LN_GDP	-0.004729	0.00162	-2.91861	0.0037
LN_Of_Total_Assets	-0.028181	0.013996	-2.01346	0.0448
OI__TA	0.558413	0.24949	2.238213	0.0258
Pll_Total_ Loans	-0.733524	0.306535	-2.39295	0.0172
LN_Of_Total_Deposits	0.026374	0.013557	1.945435	0.0524
Intercept	0.250572	0.06201	4.040835	0.0001
R-squared = 0.506841		**Adjusted R^2:** 0.497897		

5. Findings

In the global-scale equation, we see that the first lag of performance measure is highly significant. This indicates that our choice of a dynamic model over a static one was correct. In the model with ROAA as dependent variable, γ coefficient takes a value equal to 0.58. This indicates moderate levels of adjustment speed and competition. We can infer that

banking sector "lies" somewhere in between the perfect competition and monopoly market. Results are quite the same in ROAE-equation.

Turning to the other explanatory variables, the coefficient of GDP (LN__GDP_) is negative and highly significant at both equations. In fact, this finding goes in line with what we emphasized earlier about competition in banking industry. Since this sector appeared earlier to be competitive and we know that on a global level it has reached a considerable degree of maturity, we would expect that in boom conditions banks fiercely compete for potential borrowers so as to benefit from the increased demand. In such situation, they need to shrink their margins and charge lower rates so that an ever-increasing number of borrowers chooses them to fund investment projects for future implementation. Nevertheless, if we focus on the size of impact, we see that GDP is a weak regressor in estimating bank's performance. Actually, this is not surprising since internal factors seem to be the crucial ones for determining bank profits even in the previous studies. On the other hand, macroeconomic factors result to be of little-to-no impact in the majority of cases.

Non-operating income (OI__TA) appears to be essential to the high financial performance of banks. In both equations the coefficient of this variable is sizeable and significant, thus showing the substantial importance of non-traditional banking services on profitability. As the pool of bank operations expands on a continuous basis, the weight of fee income to total bank profits rises hence being a key success factor.

As expected, credit risk is found to depress profitability in both cases. This is logical considering the fact that write-offs translate in pure losses for banks. Coefficient of PLL___TOTAL_LOANS is significant and indicates that banks on a global scale must pay particular attention to the evaluation of credit and default risk to have a sustainable performance in the long term.

Capital (TE___TA) is another significant variable. In the ROAA case, capital seems to have a positive impact but it is statistically significant only at 20%. On the other hand, equity ratio appears to have a negative impact on ROAE and is significant even at 10%. In fact, using simple math logic we expect an increase in equity to be translated in lower ROAE but higher ROAA since it would allow banks to expand their scope/scale of products and services thus increasing the potential profits earned.

In the regression with ROAE as response variable, we notice that two more regressors are significant statistically speaking. Size causes profits to decrease as benefits from economies of scope and scale are outweighed by huge monetary burden that goes mainly to cover personnel wages. On the other side, bank profits rise with the increase in branch networks. Knowing that deposits are the cheapest source of funds for banks, they definitely play a huge role in improving financial performance.

6. Conclusions

In this paper,it was investigated bank profitability and its main determinants based on a data set from 2000-2017. A total of 24 banks and 432 annual observations were employed in the estimation of ROAA and ROAE equations. A dynamic panel-data model was estimated using GMM, thus accounting for endogeneity and profit persistence. This paper brings a comprehensive analysis of financial performance in banking sector not only by including internal and external variables but also by incorporating contemporary cross-country data. In addition, this study investigates whether the last recession had a significant impact on a global scale.

Our results provide useful insights into the factors which play an essential role in banks' successful performance. Firstly, it was found that global scale banking is subject to moderate levels of competition. That said, the market is expected to clear within a reasonable time frame thus eliminating the risk of monopoly-like profits. Along similar lines, it seems that such competition is the main reason for the counter-cyclical behavior of bank profitability. It is interesting to see how the model suggests an expansion of banks' scope of services and products. Such finding is derived from the statistically significant impact of income diversification on performance measure. In fact, people worldwide are evidencing nowadays a wider array of banks' services and products added to those of traditional banking. Credit risk is found to be detrimental for banks and their sustainable performance. With respect to crisis' dummies, we found that on a global scale the impact of Great Recession was insignificant.

Overall, research of this kind is key for successful performance of banks. It provides valuable guidance for managers, banking sector as a whole and bank-related decision-making bodies thus allowing them to focus their efforts on those elements that can make a real difference on bottom line and ensure sustainable financial results over long periods.

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