WORKING PAPER

46 (85) 2019

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Acknowledgments: The author is grateful to Mr. Frank Fiordelisi for his support, comments and valuable suggestions. He thanks also his colleagues at the Research Department at Bank of Albania for their assistance, comments and suggestions.

Note: The views expressed in this discussion paper are those of the author and do not necessarily reflect the views of the Bank of Albania.

CONTENT

ABSTRACT

This paper analyses the relationship between competition and banking stability in the Albanian banking sector during the period 2008 - 2017. For this reason, an index of banking competition, such as the Boone indicator, is constructed. Other alternative indicators are also calculated, such as: the Lerner index and adjusted Lerner index; and the competition indicator, which relates to profit elasticity. The main hypothesis is tested using a General Method of Moments approach used extensively in panel data studies. The analysis is based on a sample with 16 banks operating in Albanian banking sector using quarterly data. The empirical results strongly support the "competition - stability" view after the financial crisis, which implies that higher competition further improves banking stability in the case of the Albanian banking sector. In addition, it is found that bank stability is positively related to the country's macroeconomic conditions. A better bank capitalization and operational efficiency are also among the factors that further promote bank stability. Finally, it has been found that the relationship between stability and competition is linear.

JEL Codes: C26, E32, E43, G21, H63.

Keywords: Bank stability, Competition, Boone and Lerner index, Panel Data, GMM.

1. INTRODUCTION

The effect of bank competition on the stability of this sector, within a country, has been the subject of an active debate in the academic and financial policy-related circles over a long period of time. As in other industries, competition among banks may be important for the efficiency of the banking services, the quality of such products and innovations in the sector [Claessens and Laeven (2004)]. However, market disruption in the last decade questioned the benefits of extensive competition, as it is alleged that such developments pushed banks towards more risky markets and instruments, becoming the main reason for market failure [Carletti

(2009)]. This debate intensified mostly during the fall of Lehman Brothers in America in 2008 and the need to rescue a number of European banks as a result, many of which failed, while others lost their profitability and needed additional capital supplements [Beck, et al. (2013)]. However, it is not yet clear whether such crisis was as a result of excessive competition in the financial sector, and / or it was linked to market failures related to policies and regulatory acts that affect the way banks compete with one another [OECD (2010)].

This issue has been widely discussed by academics and policymakers as well, and a number of theoretical and empirical studies have attempted to shed light on the relationship between them, but have not yet reached a definitive conclusion concerning either hypothesis. Theoretically, competition is expected to enhance bank stability by increasing operational efficiency. This is because competition enhances cost reduction, promotes the delivery of new and higher quality products, increases access to bank financing, and diversifies financial products, despite what the OECD (2010) implies that that financial products in the banking sector are heterogeneous. The prevailing perception among supporters[1] of such view is that competition among banks gives them the incentives to act with discretion and maturely and, consequently, lead them to a more efficient banking system, which should promote also bank stability. However, this has been opposed recently by another challenging approach. The supporters[2] of such view argue that excessive competition reduces market power of banks. On the one hand, it increases the pressure to lower interest rates on bank lending. On the other hand, it encourages banks to raise interest rates on bank deposits. Thus, such actions are expected to reduce the profit margin, i.e. the price-cost margin. At the same time, this shrinks the "franchise value" of banks with relatively lower profit margins. It is assumed that these developments are among the main reasons that drives banks to act less cautiously by undertaking relatively higher risk strategies to offset the financial loss due to

[1] See among others: Boyd and De Nicolo (2005); Beck, et al. (2006); Schaeck, et al. (2009); Fiordelisi and Mare (2014); and Schaeck and Cihak (2014).

[2] See among others: Keeley 1990; Allen and Gale (2004); Boyd, et al. (2006); Agorakia, et al. (2011); and Leroy and Lucotte (2017).

decline in anticipated profit (franchise value), which may eventually lead to bankruptcy or bank fragility. Among this group of authors, there are also those who argue[3] that various market failures, e.g. due to information asymmetry, liberalisation and deregulation, cost shifting or even retail banking, distort the normal functioning of competition and make its standard paradigm not suitable for the banking sector. It is in fact these factors that affect negatively bank stability. Besides these mainstream views, other scholars[4] have found that excessive competition affects stability in a non-linear way. An inverted U-shaped relationship existed between them, but that too much or too little competition is expected to impede bank stability depending on the conditions in which banking system and its characteristics are. A plausible prediction from such theory would be that of Carletti and Vives (2008), who assume that once a certain threshold is reached, increasing further competition would tend to increase risk-taking incentives and the likelihood of bank failure.

This similarly inconclusive debate is, however, critical in the case of Albanian banking system. This relates to three main fundamental issues. First, capital market in Albania is relatively small[5]. Basically, the financial system, on which economic agents rely upon, consists mostly of the operation of the banking sector. This sector consists of a large number of banks operating in a specific, small, open economy. Financial developments and innovations in this sector, thus, constitute the main driving force of economic prospects, which can be seriously damaged if banks, the most prominent agents, cannot perform their financial function properly. This was also the case after the financial crisis with a large number of countries, among them Albania. At the same time, improving market and macroeconomic conditions and increasing competition in this sector has motivated large foreign-owned banks based in more developed

[3] See among others: Brunnermeier (2009); Acharya, et al. (2010); and Acharya, et al. (2013).

[4] See among others: Martinez-Miera and Repullo (2010); Tabak, et al. (2012); Jiménez, et al. (2013); and Liu, et al. (2013).

[5] For example, by the end of 2017, the ratio of financial system assets to GDP reached 110.2%, with the banking sector owning 94.4% of financial system assets (96.8% of GDP), while stock market capitalisation was the lowest in South-Eastern Europe (henceforth SEE).

countries, mainly in the Euro area, operating at relatively lower profit margins to expand their financial operations toward potentially new and more profitable markets, as it is the one in the case of Albania. On the one hand, this has fostered competition among banks in the market, enabling greater variety of products and services offered by banks and cost cuts. On the other hand, this has also raised concerns about potential costs due to excessive bank competition in a sector that has been often criticized as being "overburdened". One of these costs is related to the "Moral Hazard" problem and the possibility of transforming banks into banks being too big to fail, e.g. by the end of 2018 six largest banks held about 80% of the total banking assets of the Albanian banking system. On the other hand, although declining, with a coefficient of around 14.7% for the whole market, the Herfindahl-Hirschman index suggests that the banking industry is already moderately concentrated. Another one, as OECD (2010) puts forward, relates to the reasoning that concentration and competition are two distinct concepts given that a concentrated banking sector may still be competitive, but consolidation between banks and / entering of large foreign banks in the market, although may promote competition among existing ones further, is more likely to become a detrimental instrument, especially in retail banking. This is supported also by developments in the Albanian banking system (see Graph 1 in Appendix A), which shows that there is a relatively close relationship between the degree of market power (concentration) and the fragility to which banks are exposed, and that patterns related to bank competition precede in time those related to bank stability6. This means that bank stability may be undermined by the appetite of banks to take excessive risk due to greater competition, as their target towards more profitable instruments cease their vigilance to monitor and assess risk properly in advance.

The second crucial reason supporting this study relates to the fact that Albania has undertaken the same structural, economic and political reforms as other countries in the region. Its financial system, especially the banking system, is also at the same stage of

[6] The results of a simple correlation test between the Lerner and Herfindahl index show that the diminishing concentration has been associated with increasing competition in the banking sector, although this relationship has been reverted since the financial crisis. These results can be presented upon request.

development and integration. This sector, in particular the banking system, exhibits the same characteristics across these countries. On the other hand, as Sejko (2017) puts forward, most of them were not in the midst of the financial crisis cyclone, but although on the periphery, its effects became increasingly strong and were relatively similar throughout the region, although it must be admitted that this crisis did not affect the Albanian economy as strongly as it affected the rest of them. On the other hand, regardless of the degree of exposure, banks showed significant resistance during this period and, similarly, they emerged from it in a relatively stable position. Therefore, the relevance of our empirical results and the focus of this study on the post-financial crisis period turn our selected sample a particularly interesting environment to analyse the stability – competition nexus. The relevance of this sample, above all, is related to the crucial need to improve further the legal framework and regulatory aspects related to competition between banks. Similarly, the empirical findings and conclusions of this study may serve and are obviously important elements to address properly questions related to such crisis periods for other emerging economies as their economic development and the characteristics of the banking system are relatively the same.

Finally, our research provides some concrete results regarding other internal and external factors that could significantly affect banking stability, as their role following the financial crisis become vastly important. It is crucial, hence, to analyse the relationship among them as estimated results may serve to understand better its role among the main drivers of bank stability in the future. Even analysing whether the relationship between them has changed since the post-crisis period provides additional information that further clarifies the dynamic relationship between them. To our best knowledge, there is a scarce empirical literature using bank level data that addresses these issues in the case of the banking system in the Western Balkans, in particular in the case of Albania. This research is important also even in the context that its results are directly related to the decision-making process of the banking supervisory authorities, in our case the central bank as the responsible institution, as a way to understand and address better the mechanism of this relationship.

In the context of the existing literature, the current studies provide a detailed review of the link between bank stability and competition. Beyond these cases, however, two issues are worth noting. Firstly, only a few studies are closely related to the question we address in the case of Albania. For example, the most important study is that by Dushku (2016). This study analyses the relationship between banks risk-taking approach and competition. The first concept is captured by using the Z-Score. This indicator can be interpreted as the number of standard deviations by which a bank avoids bankruptcy. As an alternative indicator, the author uses also that related to credit quality, such as the ratio of non-performing loans. The competition indicator, on the other hand, is measured through the Lerner index. Therefore, the biggest drawback of this study is particularly related to the methodology followed to measure these concepts. On the one hand, as expressed by Hakenes, et al. (2015), the main disadvantage of Z-Score is that this indicator expresses more the efficiency of bank capital over profitability rather than captures bank fragility. However, even the indicator related to the ratio of non-performing loans has its own limitations. It is claimed that, beyond developments related with the quality of the bank lending, this indicator does not capture the effect of other risks that banks may potentially face, such as liquidity or equity risk, and other types of market risks in which banks operate. Moreover, as Haldane (2009) points out, the financial crisis proved that these traditional indicators failed to fully capture the bank's risk, especially the downside risks. None of them is, therefore, an ideal alternative indicator for assessing properly bank stability and the probability of default (bank fragility), which are undoubtedly the most used instrument in the literature [Fu, et al. (2014); and Kick and Prieto (2015)]. On the other hand, although the Lerner index is also the most widely used, according to Boone (2008) and Boone, et al. (2013), its biggest drawback has to do with the omission from it of the operational efficiency concept. The information related to this concept is thought to be an indispensable indicator to understand how banks transform their competitiveness, due to this advantage, into a mechanism that allows them to be more attractive and thus benefit by increasing their relative market share. Another concern, as stated by Beck, et al. (2013), is that the both Z-Score and the Lerner index, include both the same element of profitability in the

numerator, and therefore any positive relationship between them may be more mechanical than economically related. Second, despite the diversity of existing literature, a question still requires an empirical answer, as there is still no evidence on the nature of this relationship, in the case of a small open and developing economy such as Albania, and in particular after the financial crisis. The main question addressed in this paper looks, therefore, at the competition – stability nexus. The sample period focuses also particularly at the post-crisis period.

For these reasons, the selected sample consists of quarterly data on 16 banks operating in the Albanian financial sector during the period 2008 - 2017. The empirical analysis follows a four-step approach. First, since patterns related to bank stability and competition cannot be captured directly, then the methodology quantifying them is based on the approximation of two alternative synthetic indicators as suggested previously by the existing literature. These indicators have neither been used previously by other authors in the case of Albania nor to appraise the relationship between them. Above all, using them avoids the constraints associated with indicators used previously such as the Lerner index and the Z-Score. On the one hand, the methodology quantifying bank stability is based on two essential elements. One element relates to the issue defining bank stability, which, as Boudebbous and Chichti (2013) states, is potentially difficult to quantify it directly due to constant changes in the financial and banking environment. However, in this paper it is defined as a steady-state, in which the banking system performs efficiently its main economic functions, such as allocating various resources and risks and coping with them, and facilitating payments [Deutsche Bundesbank (2003); and Jahn and Kick (2012)], without being influenced by other external or internal factors. Therefore, the related indicator is seen as a continuous and time varying variable rather than a binary type instrument. This also avoids the lack of data sufficiency due to binary type indicators. This indicator is also fully in line with the suggestions of ECB (2007) that developments relating to fragility in the financial sector of a given country should better express its characteristics, which in our case consist primarily of banking. The other element relates to information entity and the need to quantify better all the issues related to bank

stability, for which we are based on the banks' balance sheet data[7]. The advantage in this case is particularly related to the broad set of information base, as Holló, et al. (2007) suggest, a greater variety of it allows us to capture and express reasonably better the various aspects of banking risks, e.g. capital adequacy, asset quality, income, liquidity and market risk sensitivity. Another advantage of this method relates to the applied strategy, by using the Principal Component Analysis approach suggested by Abdi and Williams (2010), to convert this set of comprehensive information into a single synthetic indicator. Therefore, we strongly believe that this indicator is qualitatively able to identify directly better the key factor that best expresses in time and without losing much information episodes related to bank stability. This approach is also conducive to the fact that it avoids any obstacles such as those suggested by Hagen and Ho (2007), e.g. insufficient volume of data or false signals related to the use of binary approach to crises.

On the other hand, patterns related to bank competition are quantified also based on the alternative approach as suggested by Boone, et al. (2007) and Boone (2008). The advantage of this method relates to two essential elements. One element relates to the fact that this approach improves further the technique quantifying bank competition, since it also captures developments related to the ability of banks to convert their competitive advantage, as a result of their operational efficiency, into an instrument that enable them be more attractive and thereby increase their market share. This helps us to understand even if the claim of the moral risk problem associated with too big banks to fail exists in our case. This helps us also to understand whether the alleged "Moral Risk" assumptions exist in our case. This indicator correlates better even with the concept approached in this paper, which is similar to that of Leon (2015), that bank competition is a driving force towards equilibrium, where the level of marginal revenue (prices) equals marginal costs (production costs) and that competition between banks and its dynamics is not determined by the number of rivals, but rather by individual freedom among competitors to gain and aim to occupy a

[7] This information is reported based on the CAELS criterion at the Supervisory Authority, in our case Bank of Albania. A detailed information on the methodology is presented by Shijaku (2018).

larger market share. The other element, as this author states, relates to the convenience of the methodology to calculate this indicator in the case of a sample with a limited number of observations, such as that in our case. The last advantage goes in line with the suggestion of other authors[8] implying that since concentration and competition are two distinguish concepts then at least quantification of the effect of competition should be proxy by an indicator that measure its impact based on bank level.

Then, the specified model is estimated based on the General Method of Moments. It includes also other explanatory variables related specifically to macroeconomic (external) and banking (internal) developments. These variables are on quarterly basis. Their information reflects developments during the period 2008 Q2 – 2017 Q4. This implies that the empirical analysis focuses only on the period after the financial crisis. In addition, we deepen our empirical analysis by checking whether the relationship between bank stability and competition is non-linear, i.e. U-shaped. Finally, we use other alternative structural and non-structural indicators to assess the degree of competition in the banking sector, such as the Lerner index and adjusted Lerner index, and the profit elasticity index. This analysis concludes by addressing also results based on an improved indicator of bank stability, which reflects also developments related to the quality way banks are bank management.

The empirical findings provide strong evidence that there is a significant positive relationship between bank stability and competition. This result supports the stability – competition view. A series of robustness check tests confirm this conclusion. This is similar to the conclusions of previous studies. Furthermore, we find evidence that the positive relationship between them exist also in the case of large banks as well as in the case of small banks. In the former case, this relation has become even stronger than that found in previous studies. On the other hand, we find no evidence of a non-linear relationship between them. Finally, in terms of other indicators, it is noted that macroeconomic conditions are relatively

[8] Berger, et al. (2004); Schaeck, et al. (2009); OECD (2010); and Weiß, et al. (2014).

important for banking stability. This effect has increased in the case of large banks. Similarly, bank stability is also contingent on improved operational efficiency and bank capitalization. Their effect is further enhanced in the case of small banks.

The remainder of the paper is structured as follows. Section 2 summarises the literature review. Section 3 presents the methodology with regards to model specification and data. The main results are presented in Section 4. The material concludes in section 5.

2. LITERATURE REVIEW

The stability – competition nexus and analysing how competition changes in the sector and whether it is beneficial for bank stability and soundness remains a difficult task [Carletti (2009); and Kasman and Carvallo (2014)]. Therefore, even its effect on them remains ambiguous and unresolved, despite the large number of different theoretical and empirical papers that explain the reasons and channels through which competition affects bank stability. Some of these works belong to an earlier period than when the financial crisis began.

2.1. THEORETICAL LITERATURE

From a theoretical point of view, as stated by Carletti (2009); and Berger, et al. (2009), there are two main streams with diametrically opposing views on the stability – competition nexus. On the one hand, there is the idea that competition in the banking sector, ceteris paribus, minimises costs and optimises resource allocation. On the other hand, it is argued that various market failures, e.g. due to information asymmetry, liberalisation and deregulation, cost shifting or even retail banking, distort the normal functioning of competition and make the its standard paradigm not suitable for the banking sector. Therefore, there is a widespread belief that intense competition, ceteris paribus, worsens bank stability, due to the risk-taking approach at least on the asset side, as numerous episodes of the crisis confirm, including financial crisis during the

2007 – 2009. Despite, as Dushku (2016) emphases, competition in the banking sector comes through two channels. One relates to the market structure, among others mergers and acquisitions, which changes the degree of market concentration in this sector. The other relates to regulatory aspects, which above all, increase / decrease barriers to entry in the banking sector and affect product diversity and quality.

Proponents[9] of the indirect link between competition and bank stability base their assumptions on the so-called "franchise value" hypothesis and the negative effect of margin. They argue that intense competition surges the pressure on banks to lower their interest rates on bank credit and increase those on bank deposits. This, they believe, erodes the net present value of banks' future earnings towards zero. As a result, the market value of banks fall. Therefore, unable to generate and maintain the previous level of profits and / or compensate for the missing, banks tend to be exposed to greater risk because they have to rely on policies to achieve their objective. As a result, market value of a bank falls. Therefore, being unable to generate and maintain the previous level of profits and / or compensate for the lost one, banks tend to expose themselves to greater risk-taking approach. This is because in order to achieve the objective related to the necessary economic profit they need to rely on more aggressive investment policies, lower the standards for selecting sound investments and weaken the process to monitor and evaluate properly bank risks related to such investments. This behaviour is assumed to dominate in more competitive markets, thereby contributing to the destabilizing effect, first on depositors and then on the government, on both asset and liability market, which as Matutes and Vives (2000) suggest increases dramatically the likelihood of bank fragility. However, as stated by Cartletti and Hartman (2002), from an asset-side perspective, lower interest rates would increase the return on investment for borrowers, which would encourage them to expand further their efforts to succeed, thus avoiding lowering profit rates through higher lending, while also reducing the risk of bankruptcy.

[9] See among others: Keely (1990); Hellmann, et al. (2000); Allen and Gale (2004); Beck, et al. (2006); Evrensel (2008); Wagner (2010); and De Haan and Poghosyan (2012).

The nexus between them seems ambiguous even from the liability side. For example, according to the approach reasoned above, hugher interest rate on deposits would increase liquidity and capital of banks in support of bank lending activity, and thus their profit. on the other side, it is assumed that systemic crises on this side can occur for two reasons. One reason relates to panic crises due to a coordinated failure among depositors, also due to their rational response to possible bank insolvency [Dushku (2016)], which Carletti (2009) classifies them under the so-called "Agency Cost" between banks and depositors. The other reason relates to the negative effect that competition can have on the interbank market by limiting it to function normally, although as the OECD (2010) confirms, most studies do not support a possible negative margin effect due to factors related with market structure and strategic interactions between banks. However, supporters of a negative relationship between them believe that strategically large banks, i.e. those that dominate most of the interbank market operations, and have excess liquidity, may refuse to finance inefficient banks, thereby boosting further bank fragility. According to Allen and Gale (2004) this can be related to two reasons. The first reason may be linked to the fact that by assuming that they are acting as "Price-Taker" each of the banks believes that their actions do not affect market equilibrium, and vice versa if the market is non-competitive. The other reason may be related also to the fact that banks with higher solvency may refuse to support financially banks in need of liquidity because they feel that by doing so they are limiting their exposure to riskier banks. In other words, they avoid further spread of "infection" to other financially stronger banks. In this way, competition and such behaviours decrease further the solvency of inefficient banks, which undermines banking stability perhaps even due to a potential panic-related crisis. Supporting the reverse relationship between them, Marquez (2002) argues that excessive competition worsens bank efficiency, with existing (large) banks having an advantage over new (smaller) banks due to information asymmetry. As Repullo (2004) and Goldstein, et al. (2005) put forward, this lowers bank margins. On the one hand, this is because the increasing competitive pressure pushes banks to become more attractive by upward shift in deposit interest rates, which may even force banks to take on even greater expressive risk. On the other

hand, the interest rates on loans granted would also be higher, given the need to minimally cover the cost of higher interest rate on deposit, which increases the likelihood of bank fragility as high rate shifts down solvency condition of borrowers.

In addition, there is also a series of other papers that support the negative relationship between competition and bank stability, but unlike the first group, their arguments focus on the positive effect of the increasing margin hypothesis. Their reasoning, as Berger, et al. (2009) claim, is based on the argument that in concentrated markets the large banks have a higher rate of return (net profit), and thus face a greater opportunity cost in the event of bankruptcy. Therefore, they tend to be more prudent against excessive risk. Otherwise, they respond by raising their share capital and also by rejecting those investments that could hinder future profits and thereby deteriorate their financial soundness and stability. For example, Boot and Thakor (2000) evidence that larger banks tend towards reasonable bank lending. Their lending rate is, therefore, low but qualitative. This implies that their market power drives the larger banks towards higher quality lending, better capital distribution, and thus towards improved financial soundness as a result of safer profit rates and lower risk [Boyd, et al. (2004); and Amidu and Wolfe (2013)]. Consequently, these banks would have a higher level of capital, which could serve to protect them from possible unexpected short-term shocks, e.g. adverse economic shocks; lack of liquidity; and moral hazard; which have a negative impact on the stability of the banking system [Beck, et al. (2006); Berger and Bouwman (2013); Fiordelisi and Mare (2014)].

The positive effect associated with the upward margin is supported in principle also by OECD (2010), who however argues as well that its impact materialises more on the negative side, as the effect of higher interest rates is expected to be greater on rising costs to bank borrowing. This argument is also supported by other authors[10], who acknowledge that while in a less competitive market, banks benefit from higher interest rates, they would also be exposed to greater

[10] See among others: Boyd and de Nicolo (2005); De Nicolo, *et al*. (2006); De Nicolò and Lucchetta (2009); Schaeck, *et al*. (2009); Soedarmono, *et al*. (2011); and Soedarmono, *et al*. (2013).

risk on the asset side as increasing interest rate tend to reduce the solvency of borrowers. Even in the interbank market, the effect of higher rates would encourage banks to engage in higher risk investments. According to these authors, therefore, on the one side, less competition undermines the solvency condition of borrowers. On the other side, this discourages borrowers' efforts to be more successful. In both cases, as confirmed by Fu, et al. (2014), its effect materialises on bank fragility. This effect may also increase due to the decline in potential bank lending flows. The idea of other supporters of the stability-competition view stands also by the so-called "franchise value", but their arguments focus on the hypothesis of the positive effect of the downward margin. This is also supported by the reasoning of Kane (2000) that increasing market competition between banks avoids the "Moral Hazard" problem of banks being too big to fail. The positive relationship between stability and competition is supported also by evidence from other studies that back the early assumption of Hay and Liu (1997) that higher degree of competition can produce the same positive results as in other sectors, such as improving operational efficiency, enabling a greater variety of products and related innovations, better service, lower prices and greater access to financial instruments.

Finally, unlike the two mainstream views, Martinez-Miera and Repullo (2010), by adapting the model as suggested by Body and De Nicolo (2005), assume that there is a U-shaped (non-linear) relationship. One plausible suggestion from this theoretical assumption would be that, once a certain threshold is reached, a further increase in competition tends to increase the incentives for taking excessive risk, which is expected to boost the likelihood of bank failure [Carletti and Vives (2008)]. This assumption is supported also by findings of other studies[11]. However, as the OECD (2010) states, a reversed U-shaped relationship may exist between them, but a greater or lower degree of competition is expected to affect stability of banks depending on the conditions of banking system and its characteristics.

[11] See among others: Berger, et al. (2009); Jeona and Limb (2013); Jiménez, et al. (2013); Liu, et al. (2013); and Samantas (2013).

2.2 EMPIRICAL LITERATURE

In line with appropriate theoretical views, many recent studies have analysed empirically the nexus between bank stability and competition. Some authors have tested the competition-stability nexus by focusing on competition indicators based on the structure-conduct-paradigm[12] and the relative market-power hypothesis[13], but have found mixed evidence. For instance, using survey data on banking system governance rules for 107 countries, Barth, et al. (2004) proved among other things that tightening entry barriers is negatively related to bank efficiency, while limiting the participation of foreign banks tends to increase banking fragility. Even, Boyd and De Nicoló (2005) show that in a concentrated market banks tend toward more risk-taking and increasing concentration leads to higher loan rates charged to borrowers. Boyd, et al. (2006) use a cross-sectional sample of about 2,500 U.S. banks in 2003 and a panel data set of about 2,600 banks in 134 non-industrialized countries for 1993-2004.

Other authors find that banks' probability of failure increases with market concentration, even though as Berger, et al. (2009) suggest, their conclusions are drawn using some form of concentration indicators, which may be insufficient measures to properly proxy any market structure. Bushman, et al. (2016) use a new survey approach of competition, which reflects managers' current perceptions of competitive pressures deriving from all different sources, including potential entrants, non-bank competitors and labour markets. Their results confirm that higher competition is associated with lower underwriting standards, less timely loan loss recognition and a shift towards non-interest revenue. Leroy and Lucotte (2017) use the Z-score and systemic dimensions of risk and the Lerner index as in Ahmed and Mallick (2017) to analyse the relationship between competition and bank risk across a large sample of European listed banks over the period 2004–2013.

[12] See among others: Beck, et al. (2006); Boyd, et al. (2006); Levy Yeyati and Micco (2007); Uhde and Heimeshoff (2009); de Haan and Poghosyan (2012a); de Haan and Poghosyan (2012b); Mirzaei, et al. (2013); Fernández, et al. (2016); and Pawlowska (2016).

[13] See among others: Levy Yeyati and Micco (2007); Uhde and Heimeshoff (2009); Wagner (2010); Fiordelisi and Mare (2014); and Pawlowska (2016).

Their results suggest that competition encourages bank risk-taking and then increases individual bank fragility[14].

By contrast, Beck, et al. (2006); and De Nicolò, et al. (2009) found that crisis are less likely in economies with more concentrated banking systems. Another study by Schaeck, et al. (2009) uses the Panzar and Rosse H-Statistics, as an alternative measure of the degree of competitiveness for competition in 38 countries during 1980 – 2003 and concludes that more competitive banking systems are less prone to systemic crises and that time to crisis is longer in a competitive environment. Jiménez, et al. (2013) use a unique dataset for the Spanish banking system and report that standard measure of market concentration do not affect the NPL ratio, but found evidence in favour of the franchise value paradigm when using the Lerner index. On the other hand, Amidu and Wolfe (2013) investigate how the degree of competition affects diversification and stability using a sample of 978 banks in 55 Emerging Market Economies over the period 2000–2007. The core finding is that competition increases stability as diversification across and within both interest and non-interest income generating activities of banks increase. In addition, their analysis identifies revenue diversification as a channel through which competition affects bank insolvency risk in emerging markets[15]. Besides, there are also other papers that validate both views. For example, Berger, et al. (2009) analyse empirically the link between credit risk (NPL ratio), bank stability (Z-score index) and the capital ratio (capital ratio) and several measures of market power, namely Lerner and Herfindahl-Hirschman index, using bank level data from Bankscope on 8235 banks in 23 developed countries. Their results, consistent with the traditional "competition-fragility" view, suggest banks with a higher degree of market power also have lower overall risk exposure. However, the data also provide some support for one element of the competition-stability view, namely, that market power increases loan risk, which may be offset in part by higher capital ratios.

[14] Other studies that confirm the inverse relationship between bank stability and competition include those by Beck, et al. (2013); Jiménez, et al. (2013); Soedarmonoa, et al. (2013); Fu, et al. (2014); and Weiß, et al. (2014).

[15] Other recent empirical papers that validate "competition-stability" view include Jiménez, et al. (2010); Nguyen, et al. (2012); Liu and Molyneux (2012); Amidu (2013); Jeona and Limb (2013); and Schaeck and Cihak (2014).

From the empirical point of view, papers mentioned above produce cross-country evidence. A few studies focus on a single banking sector. For example, Zhao, et al. (2010) examine the degree to which deregulatory measures aimed at promoting competition lead to higher risk-taking in Indian banking system. The authors show evidence that improved competition through deregulation does not lead to efficiency gains, but rather encourages further risk-taking. Fungacova and Weill (2013) analyse this issue based on a large sample of Russian banks over the period 2001 – 2007 and in line with prior literature, they also employ the Lerner index as a measure of bank competition. Results clearly support the view that tighter bank competition enhances the occurrence of bank failures. Kasman and Kasman (2015) analyse the relationship between competition (proxies by the efficiency-adjusted Lerner) and bank stability (proxies by Z-Score and NPL ratio) on Turkish banking system industry. The main results indicate that competition is negatively related to the NPL ratio, but positively related to the Z-Score.

At the same time, only a few papers are loosely related to the research question we focus in the case of Albania. The most relevant work is by Dushku (2016)[16] who investigates the link between competition (measured by Lerner Index) and bank risk-taking (measured by Z-Score) for 15 banks operating in the Albanian banking system during the period 2004 – 2014. The author finds a positive link between competition and bank risk and shows that the nexus between total (plus foreign) credit risk and competition is non-linear. The two most recent studies by Shijaku (2017b) and Shijaku (2018) analyse this relationship to some extent based on the bank size indicator (measured as the ratio bank's assets to total banking system assets) and the concentration ratio (measured via the Herfindahl index). Results support the positive relationship between bank stability and bank size, although its effect is relatively low and statistically insignificant. This relationship remains relatively stable despite methodological changes. They suggest also a reverse relationship between banking sector concentration and stability, which implies that stability improves with the decrease in the level of concentration.

[16] Note (2006) based her study on the Panzar-Rosse's H-statistics approach for measuring bank competition in the Albanian banking system focusing on the period 1999-2006. The author finds that banks in Albania operate under conditions of monopolistic competition.

Similar to the theoretical debate, empirical findings are also challenging. For example, although researchers may prefer a particular indicator, there is no definitive consensus on how to measure banking competitiveness. This is also supported by the conclusions of Carbó, et al. (2009) and Liu, et al. (2013) that existing proxy of competition indicators provide different conclusions regarding the degree of competition as they tend to measure different things[17]. This problem is the same in the case of indicators that measure banking stability. A major concern in this case is that most of them do not fully reflect all the risks to which banks may potentially be exposed. Similarly, they do not clearly reflect which aspect of risk effectively aligns. It is also obviously that the biggest obstacle of extant empirical research vary widely and heavily depend on the data used, as well as on the period and countries analysed [Bushman, et al. (2016)].Therefore, one key challenge that explains such mixed results is related to the inappropriate measure used to properly identify bank competition and bank stability [Pawlowska (2016)].

3. METHODOLOGY AND THE DATA

3.1 MEASURING BANK COMPETION: THE BOONE INDICATOR

The concept of competition, while always central to economic thinking, is among those issues that has taken on a multitude of interpretations and meanings. Its beginnings can be found in Wealth of Nations doctrine of Adam Smith, in which according to Leon (2014) free competition is defined as an ordering force towards equilibrium. This equilibrium is achieve at the moment where the level of marginal revenue (prices) equals marginal expenses (production costs). In this sense free competition, as suggested, is a race between market players to gain a relatively higher market share and therefore it is not determined by the number of rivals but rather by individual willingness and freedom to act unconditioned.

[17] See also Bikker, et al. (2012).

From a practical point of view, however, adapting to this notion and measuring competition in the financial markets, especially in the banking sector, is complex and not possible to be measure directly due to the characteristics of this sector which among other things are related, inter alia, to information asymmetry in this sector, costs transferring issues, etc. [OECD (2010)].

In the existing literature measuring competition in the banking sector is based on two different approaches: structural and unstructured or the so-called concept of contestability. The first approach aims to explain competitive behaviour by analysing the structural characteristics of the market, in our case those related to banking sector. Its main assumption relates to the rationale that competitive behaviour is conditioned by the possibility of collusion between banks and their ability to dominate market behaviour, which increases with market concentration [Arrawatia (2012)]. Among the most commonly used indicators are those related to the number of banks in the market, bank size, concentration ratio and the Herfindahl-Hirschman index[18]. The main advantage of these indicators relates to the simplicity of the methodological calculation. However, their biggest limitation relates to the argument that they are crude indicators that do not take into account bank allocation as long as a highly concentrated market is not necessarily less competitive [Claessens and Laeven (2004); and OECD (2010)]. They even disregard the fact that banks with different ownership behave differently and banks may not compete directly with each other in the same segment [Carbo, et al. (2009)]. Therefore, to avoid these constraints, the other alternative (non-structural) approach studies the competitive behaviour among banks relying on the analysis of the "price-to-cost" margin. The advantage of this method is related to two elements. One element relates to the ability to measure competition behaviour directly. The other element relates to its advantage to analyse this behaviour accordingly to dynamic developments in banking sector. Among the most commonly used indicators, based on this technique, is the one associated with the

[18] The Herfindahl-Hirschman index is an indicator that measures concentration ratio. It is used mostly by the Competition Authorities. Shijaku (2017b) also calculates the IHH index, according to which the banking sector has a moderate concentration.

Lerner index[19], also known as the first-generation index. However, despite its advantages, Leon (2015) thinks that this indicator expresses mostly the power of market forces to determine price rather than measuring the degree of competition. According to him, another limitation of this indicator relates to its inability to distinguish between markets that have high margins due to inelastic demand and those that have such margins because they are less competitive. According to Oliver (2006), this indicator can also overestimate market power. This happens for two reasons. On the one hand, this indicator does not take into account risk-taking approach of banks. On the other hand, it does not sufficiently reflect the fact that banks that use their funds to allocate relatively more loans enjoy higher margins of returns. Therefore, as stated by a number of authors[20], both of these limitations make this indicator inappropriate to assess the relationship between competition and stability. In addition, as Boone, et al. (2007) and Boone (2008) claim, even if the Lerner index increases with decreasing competition, the overall market power trend may increase, decrease, or stay the same due to the 'reallocation effect' from less efficient to more efficient banks. So, the biggest drawback of this indicator is the lack of information related to the ability of a bank to use its competitiveness as a result of improving operational efficiency advantage to increase its relative market share.

Therefore, to avoid these problems, a series of studies[21] focusing on the banking sector use an alternative synthetic indicator, first proposed by Boone, et al. (2007) and subsequently developed latter by Boone (2008). Its theoretical explanation is similar to the rationale of the efficient structure hypothesis proposed by Demsetz (1973) and as such relies on the concept of relative difference

[19] The Lerner index, first developed by Lerner (1934), has been widely used in empirical studies, whereas in the case of Albania it is first calculated by Dushku (2015) and is presented as the ratio of price-to-cost margin as a percentage change to the level of the price. Another indicator, which is based on this approach, is also the H-statistic according to Panzar and Rose (1987) used in the case of Albania by Note (2006). This indicator also suffers from a number of theoretical and practical limitations. For more see Leon (2015).

[20] See among others: Berger, et al. (2009); Turk Arris (2010); and Beck, et al. (2013).

21 See among others: Van Leuvensteijn, et al. (2011); Van Leuvensteijn, et al. (2013); Fiordelisi and Mare (2014); Kasman and Carvallo (2014); Schaeck and Cihák (2014); Duyguna, et al. (2015); and Kasman and Kasman (2015).

of profitability among banks. The idea of this profit-elasticity index, which is also referred as the Boone indicator (β), lies on the assumption that in completely competitive market banks with relatively superior efficiency ratio than others, i.e. banks with lower marginal costs and price levels, are more competitive and attractive to the public. For these reason they gain more benefits in terms of profit as a result of market share reallocation from a less efficient to a more efficient bank. This effect is supposed to become stronger in a highly competitive market structure. This means that in a highly competitive market banks sacrifice more for being in a disadvantage cost-to-price margin position.

To put it differently, banks are punished more harshly in terms of profits and their market share due to lack of operation efficiency. Consequently, the stronger this effect the greater the absolute value (β) will be, which is also an indicator of the competitive conditions in that specific market. In the empirical application, the simplest equation to identify the Boone indicator, for bank i at time tis defined as follows:

$$ln(\pi_{it}) = \alpha + \sum_{l=1...T}^{L} \beta ln(MC_{l,it}) + \sum_{k=1}^{K} \omega \lambda_{k,it} + \varepsilon_{it} \qquad (1)$$

where π and MC denotes the profit and the marginal cost for banks (proxy efficiency) respectively; α is the bank fixed effect; λ is a set of control variables associated with the coefficient ω; ln is the log-linearized transformation of the variables; and ε is an idiosyncratic shock. The market equilibrium condition is $E=0$. The E-statistic is $\sum_{l=1}^{L} \beta$, which gives the profit elasticity, that is, the percentage change in profits of bank i as a result of a percentage change in the cost of this bank. Theoretically, this indicator is expected to have a negative value, i.e. the increase in costs reduces profit, which can be interpreted as a reduction in the capacity of the bank to affect its losses due to an increase in competition[22].

[22] However, Leon (2015) does not exclude the possibility of a positive coefficient in the case of banking competing among them through product quality.

Theoretically, efficient banks may choose to translate lower costs into higher profits or lower production prices, in order to gain market share. As a consequence, when using this measure as an approach to analyse competition in the banking sector, some researchers[23] transform the formula of Boone indicator and replace the value of profit with a bank market share value, as follows:

$$ln(MS_{it}) = \alpha + \sum_{l=1\ldots T}^{L} \beta ln(MC_{l,it}) + \sum_{k=1}^{K} \omega \lambda_{k,it} + \varepsilon_{it} \qquad (2)$$

Where, MS is the market share of bank i at time t. In addition, as in the case of the Lerner index, the Boone indicator is also based on the estimation of the marginal costs, which, based on Fiordelisi and Mare (2014)[24], are estimated based on a trans-log cost function (TCF), as follows:

$$\begin{aligned} lnTC_{it} = {} & \alpha_0 + \alpha_1 lnQ_{it} + 0.5\alpha_2 (lnQ_{it})^2 + \sum_{j=1}^{3} \beta_j lnP_{it\,j} \\ & + \sum_{j=1}^{3}\sum_{k=1}^{3} \theta_{jk} lnP_{it\,j} * lnP_{it\,k} + \sum_{j=1}^{3} \gamma_j lnQ_{it} * lnP_{it\,j} \\ & + \tau_1 Trend + 0.5\tau_2 (Trend)^2 + \tau_3 Trend * lnQ + CRISIS + \varepsilon_{it} \end{aligned} \qquad (3)$$

Where, TC is the total costs of bank i at time t, Q is the bank output, P is a vector of input prices, namely labour price (P_1), price of borrowed funds (P_2) and capital price (P_3), $Trend$ is a time trend capturing the dynamics of the cost-function (efficiency) over time, $CRISIS$ is a dummy variable to account for the effect of the GFC, and α, β, θ, γ and τ are coefficients to be estimated. ε_{it} is a two-component error term computed as follows:

$$\varepsilon_{it} = \mu_{it} + \omega_{it} \qquad (4)$$

Where, ω_{it} is a two-side error term, and μ_{it} is a one-sided disturbance term representing inefficiency. Then, from Equation (3), assuming that input prices are homogeneous, the marginal cost can be derived as follows:

[23] See among others: Van Leuvensteijn, et al. (2011); Tabak, et al. (2012); and Van Leuvensteijn, et al. (2013).

[24] Dushku (2015) follows also the same approach to calculate marginal cost.

$$MC_{it} = \frac{\delta TC_{i,t}}{\delta Q_{i,t}} = \frac{TC_{i,t}}{Q_{i,t}}\left[\hat{\alpha}_1 + \hat{\alpha}_2 lnQ_{it} + \sum_{j=1}^{3} \hat{\gamma}_j lnP_{it\,j} + \hat{\tau} Trend\right] \quad (5)$$

The cost function must be homogenous of degree one in input prices, which imposes some restrictions on parameter estimates. Linear homogeneity means that the percentage increase in all three input prices raises the value of the cost by the same proportion. This property implies that the value of these three inputs prices included in the cost function represents the total cost. The linear homogeneity in the property of input prices requires that the following restrictions on parameter estimates hold:

$$\sum_{j=1}^{3} \theta_j = 1 \quad (6)$$

$$\sum_{j=1}^{3} \beta_j = 0 \quad (7)$$

$$\sum_{j=1}^{3}\sum_{k=1}^{3} \theta_{jk} = 0 \quad (8)$$

For the purpose of our research we estimated Boone indicator, using both Equation (1) and Equation (2). However, the former is operationally impossible due to the negative net income generated by some of the banks operating in the Albanian banking system in 2008-2010. To overcome this problem, the bank profit value was replaced by the volume of net interest profit. Then, these equations are estimated using the Ordinary Least Square (OLS) approach with random effects[25].

The advantages using this indicator are related to three main issues. First, this indicator fits better with the definition approximated in this paper, which relates to the ability of banks to convert their competitive advantage as a consequence of operational efficiency in the price-cost margin as a way to gain a relatively higher market share. This

[25] See also Shijaku (2016b) for more details.

indicator is, also, easier to calculate in the case of a sample with a limited number of observations [Leon (2015)], as is our case[26]. Second, the Boone indicator offers an alternative synthetic indicator, which enables a dynamic analysis of the competition behaviour of banks accordingly to how it changes over time rather than offering a static one. The methodological aspects on how the Boone indicator is calculated are also consistent with the recommendations of other authors[27] who suggest that since concentration and competition are two distinguish concepts and bank behaviour related to competition changes among banks then its impact should be measured according to the individual behaviour of the banks. On the other hand, this technique enables us to use this indicator in cross-section analysis. Finally, this indicator relies on the same assumptions as in the case of the H statistic and the Lerner index[28].

3.2 THE EMPIRICAL APPROACH

This paper, in particular the empirical model specification, relies on the extensive review of previous studies dealing with difficult bank distressing times. This includes works by Cole and White (2012); Betz, et al. (2014); and Black, et al. (2016)[29]. Therefore, on their basis, it is assumed that bank stability is a function of various macroeconomic (external) and banking (internal) indicators. This function is expressed as follows:

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[26] However, as in the case of other non-structural indicators, one must admit that one of the main limitations of this indicator relates to its assumption that banks provide homogeneous goods and services. Regardless, it must be acknowledged again that the Boone indicator remains one of the most monotonically related to the concept of competition.

[27] Berger, et al. (2004); Schaeck, et al. (2009); OECD (2010); and Weiß, et al. (2014).

[28] Schaek and Cihák (2014) claims that Boone indicator reflects more than 80 percent of the set of information included in these alternative indicators.

[29] Previously similar studies in the case of Albania, among which those by Shijaku (2016a); Shijaku (2017a) and Shijaku (2018), build the same model. As will be noted, this study differs from them, however, as it deepens further the empirical analysis by basing its analysis on non-structural indicators for measuring bank competition rather than using structural ones, e.g. such as bank size, concentration ratio and / or Herfindahl index. Meanwhile, compared to the study by Shijaku (2017c) the time horizon in this paper is longer.

$$CAELS_{i,t} = \alpha + \beta_1 * BOONE'_{j,t} + \beta_2 * GDP'_{j,t} + \beta_3 * PSRISK'_{j,t} + \beta_4 * BOE'_{j,t} + \beta_5 * BFL'_{j,t} + \beta_5 * CRISIS'_{j,t} + \varepsilon_{i,t} \quad (9)$$

Where, $CAELS$ is related to stability indicator of bank i at time t, with $i = 1, \ldots, N$ and $t = 1, \ldots, T$. This indicator is expressed as a function of a set of explanatory variables among which bank competition ($BOONE$), which is the main focus in this study; other macroeconomic variables related to economic activity patterns (GDP) and relatively sovereignty country risk ($PSRISK$); and other indicators related specifically with banks, namely bank operational efficiency (BOE) and bank financial leverage ratio (BFL). $CRISIS$ reflects the financial crisis period and therefore captures its effects. α is a constant term; β_1 is a set of coefficients that would be taken out of estimated model, $\varepsilon_{i,t}$ is an error terms that is assumed to be identically and independently distributed with mean of 0 and variance $\sigma_u^2 A = \pi r^2$. In this model there are two important elements. One element relates to the sign and magnitude of the coefficient β_1. Their results are those on which the conclusions of this paper will be based. Its value expresses the effect that marginal changes of competition have on bank stability. On the other hand, as can be seen, all the indicators fit into the specified model at time t. This is based on the assumption that the stability of banks is affected immediately by changes in market conditions in which banks operate. Therefore, this indicator is considered to be a fast-moving variable as it is very sensitive to any market changes.

One potential problem with Equation [9] is related to the endogeneity issue among each variables[30]. The specified model is therefore estimated through the General Method of Moments, as proposed by Arellano and Bond (1991) and Arellano and Bover (1995). This is also because this approach, as it is advocated by different authors[31], is commonly known for solving any potential problem related to endogeneity issues in panel data sample as it is our case. This approach is also commonly known for solving other issues related to heteroscedasticity or partial identification. It provides robust results to the remaining un-modelled components and

[30] See among others Shijaku (2018) for more details.

[31] See among others: Anderson and Hsiao (1981); Judson and Owen (1999); Hall (2005); Bond and Windmeijer (2002); Allison (2009); Han and Phillips (2010); and Ansari and Goyal (2014).

resolves un-ward (down-ward) bias in standard errors t-statistics due to its dependence on estimated values (since it uses the estimated residuals from an one-step estimator), which is especially true in the case of a data sample with a relatively small cross-section dimension [Arellano and Bond (1991)] as it is our case[32]. Another important element is related to the instrumental variable, which in our case fulfil two characteristics. One characteristic relates to the use of those instruments based on information presented by independent indicators previously used as explanatory variables. This approach is also suggested by Roodman (2009). The other characteristic relates to their number, which in this case goes up to 4 lags based on the assumption that bank decision-making is revised annually based on the last year performance and future expectations. Also, model diagnostics relies on the results of the Arellano-Bond AR (1) and AR (2) tests for the first and second residual autocorrelation, as well as the Sargan and Hensen test to determine the validity of the instrument indicators (i.e. tests related to lack of serial correlation and validation of instrument variables).

3.3 SAMPLE AND THE DATA

The sample data of this study consist of a set of data with quarterly frequency. Some of them relate specifically to the balance sheets of 16 banks operating in Albania. The rest expresses developments related to the banking industry and the macroeconomic situation. The advantage of our sample relates to the reliability of the information. It covers with data the developments related to all banks that have been operating in Albania over the last two decades. However, given the focus of this study, the empirical analysis consists of developments during the period 2008 Q2 - 2017 Q4, since the beginning of the pass-through effects of the financial crisis on the Albanian economy coincides with the second half of 2008[33].

[32] The GMM does not require any distributional assumptions on the error term and it is more efficient than the Two Stage Least Square approach, since it accounts for heteroscedasticity [Hall (2005)].

[33] Albanian economy was not directly affected by the financial crisis, but the spill-over effects through financial and trade linkages were immediately transmitted to the domestic economy, starting in 2008 Q2. This is why the empirical analysis in this study focus particularly in the period after 2008 Q2.

Altogether, this includes a balanced panel of 624 observations and 39 periods.

The variables used to calculate the competition indicator are as a follow. *TC* is the sum of personnel expenses, other administrative expenses and other operating expenses. The bank's single output, *Q*, is proxy by bank total assets. P1 is calculated as the ratio of personnel expenses over total assets. P2 is the ratio of other administrative expenses plus other operating expenses over total fixed assets. P3 is the ratio of interest expenditure over the sum of total deposits. The variables used for empirical analysis are approximated as follows. *CAELS* represents bank stability conditions. It is estimated as explained by Shijaku (2018). This indicator, along with that of *BOONE*, has been transformed into an index, taking as a base year the average performance of 2010. Its increase implies improved bank stability. On the other hand, an increase in the *BOONE* indicator implies that the improving operational efficiency of a particular bank has been accompanied by an increase in its degree of competition and consequently a relative upsurge in the market share of that bank. *BOE* is approximated as the ratio of gross income to gross expenditure. An increase in this ratio reflects an improvement of operational efficiency of individual bank. BFL is constructed as a ratio of total bank equity to total bank assets. Even for this indicator, growth implies improvement, which in this case is related to better capitalization of banks. On the one hand, the indicators related specifically to banking behaviour and bank stability are calculated individually. Therefore, they reflect developments for each bank individually. On the other hand, the macroeconomic variables are aggregated indicators. They represent the state of the economy. *GDP* represents the Gross Domestic Production. It is transformed in real terms by deflated with the Consumer Price Index. *PSRISK* represents the spread between domestic 12 months T-Bills and the German 12 months T-Bills. These indicators are transformed also in real terms by subtracting the respective domestic and German annual inflation rate. Finally, *CRISIS* is a dummy variable that is expectedto capture the effect of global financial crisis on stability of each individual bank. It takes the value of 1 during the period 2008 Q4 to 2010 Q4, and 0 otherwise. All the data represent the end-period values. They are log-transformed, besides *PSRISK* and *CRISIS*.

Finally, the dataset used in this paper has several sources. Data on *GDP* are taken from the Albanian Institute of Statistics. Data on the domestic T-Bills rate are taken from the Ministry of Finance. Data on German 12 months T-Bills rate and German Consumer Price Index are taken from Bloomberg. The rest of the data are taken from Bank of Albania.

4. EMPIRICAL RESULTS ANALYSIS

4.1 THE MAIN BASELINE REGRESSION RESULTS

This section presents the main results of our empirical approach, as specified in Equation [9]. Initially, prior to the empirical estimation, all the data have been subject to a unit root test procedure on the argument to understand their properties and also to be sure that their order of integration fulfils the criteria for our empirical estimation approach. The latter is a pre-required condition in order to receive consistent and unbiased results. Therefore, the unit root test approach includes the Augmented Dickey-Fuller (ADF) and the Phillips-Peron (PP) Fisher Chi-square tests. The reason is twofold. First, these tests are built on the same null hypothesis that panel variable are stationary. Second, they are mostly used for unbalanced panel model, as it is our sample. Results are presented in Table 4 in Appendix. Results of such analysis are reported in Table 3 in Appendix A. These results suggest that BOE and BFL are integrated of order zero I(0). This means that they are stationary, so they enter the model in level. The other variables, namely *CAELS*, *BOONE*, *GDP* and *RISK*, are found to be integrated of order one, I(1). This means they pose non-stationary properties. Therefore, they enter the model as a first difference as it is this data generating process that transforms them into stationary variables[34]. This implies that the data generating process of these variables in this way is consistent also with the variable stationarity compulsory criterion that must be met in order to be able to continue our empirical analysis based on the General Method of Moments.

[34] These results are robust also to other unit root test approaches, including the Im, Pesaran and Shin W-stat test and Fisher test. Data can be provided upon request.

In addition, this section presents also the results of the main empirical findings, according to the model specified in equation [9]. They are presented in Table 4 in the Appendix A. They reflect the behaviour of all banks operating in the Albanian banking system from the prospective of a single systematic framework. On the one hand, in column [1] and [2] are reported the results of a linear relationship between stability and competition are reported. The difference between these models is related to the indicator that captures the effects of the financial crisis as this variable is not included in the first equation. On the other hand, columns [3] and [4] reflect the results regarding a possible nonlinear relationship between bank stability and competition. This relationship, as in the case of other studies[35], is tested by including in our baseline model an additional variable such as $BOONE^{\wedge 2}$. This indicator expresses the square power of the Boone indicator. Therefore, as suggested by these studies, the linear relationship is confirmed when the sign before the coefficient associated with these indicators is different and at the same time the effect expressed by them is statistically significant. Otherwise, a different result does not reflect and should not be consider as a nonlinear relationship between bank stability and competition. Even in this case, as noted, the only difference between equation [3] and [4] relates to the crisis indicator. The rest of the indicators remain the same. The competition index is also the same across all equations. Likewise, all specified models are evaluated according to the approach associated with the General Method of Moments as previously explained in section 3.2[36]. Therefore, as can be noted, the results of diagnostic tests associated with the AR(1) and AR(2) and that of Sargan and Hensen test are reported also at the bottom of the table. On the one hand, AR(1) and AR(2) tests should reject the null hypothesis of no first order serial correlation, but not the null hypothesis of no second order serial correlation of the residuals. This requires that the statistical value of the probability of the AR(1) test to be less than 10 percent, while for the AR(2) test its value should be greater than 10 percent. On the other hand, Sargan and Hansen test related to

[35] See among others: Jiménez, et al. (2013), Liu, et al. (2013); Fu, et al. (2014); and Kasman and Kasman (2015).

[36] The empirical analysis is based also on standard errors and co-variance (adjusted degree of freedom) according to the 'White Cross-Section' approach.

over-identification problem indicates whether the instruments used are not correlated with the error term. For this reason, the statistical value of the probability of the statistic J should be higher than 10 percent. Results of the first tests, according to the probability value of the AR(1) and AR(2), confirm that the criteria necessary to pursue the empirical analysis according to the selected estimation approach, namely the General Method of Moments, are met. Even the results of the second test confirm that the instruments selected are suitable and meet the necessary conditions. This means that our model is properly specified and that the empirical analysis is consistent and in accordance with General Method of Moments approach.

In terms of other empirical results, their analysis is based on the evaluation of size, sign and statistical significance of the coefficients associated with each of the explanatory indicators. A general prescription of this analysis points to the fact that ***CAELS***, namely bank stability, responds to shocks related to other factors, in this case to explanatory variables, according to theoretical expectations. This conclusion is similar to previous findings in the case of Albania[37]. This confirms the fact that the methodological changes and extension of the sample time horizon do not affect the relationship between them, perhaps also because the relationship between them has not changed. This points out the importance of these indicators in future analysis regarding expectations on bank stability conditions and drivers that may influence it. On the other hand, examining these empirical results individually offers also important supplementary information. For example, the coefficient before ***BOONE*** has a positive sign. His sign is the similar in all cases. This means that does not change despite the methodological differences between each of the equations. These results confirm once again as in the case of Shijaku (2017c) that the relationship between ***CAELS*** and ***BOONE*** is simultaneous, thus positive. This suggests that increasing competition improves bank stability, as a higher value associated with the Boone indicator implies a higher degree of competition in the market. This proves that the size of a bank, or the relative market share of that bank, is a directly integrated function of market competition. On the other hand, this implies that increasing

[37] See among others studies by Shijaku (2016a); Shijaku (2017a); Shijaku (2017b); and Shijaku (2018).

competition in the banking sector boosts the market value of banks and improves also their stability by encouraging banks to reduce their overall risk exposure. This result is, however, different from that of Dushku (2016), which includes also the investigation of the nexus between also in the period before the crisis. This confirms that the link between bank stability and competition has changed after the financial crisis. Therefore, different to the pre-crisis period, the one after it has been characterized by a positive relationship between them. This means that developments that have fostered positive competition among banks have been associated with higher level of bank stability, and vice versa if the trend has been reversed. This confirms its importance as a primary indicator of bank stability, especially during times of crisis. This result thus confirms the view of the stability-competition nexus and the importance of this relation in the case of Albania. Therefore, as it is interpreted in the case of other studies[38], it can be said that increasing competition in the banking sector leads to improved bank stability. Given that its coefficient is also statistically significant, the relation between them can be appraised as relatively substantial, as the effect of competition on bank stability is found to be significant.

These results are also the same when the sample is divided into two groups based on the size of each banks. This approach involves dividing banks into large banks and small banks[39]. The results of this analysis, as reported in columns [1] and [3] in Table 5 in the Appendix, prove that even in the case of these samples the signs before the coefficient are positive. So, this confirms once again that competition goes hand in hand with banking stability. This implies that the relationship between them is the same for both large and small banks. In both cases, the relation between them is also found to be statistically significant. This confirms once again the positive importance of competition to banking stability. However, given the magnitude of the coefficient, it is noted that the coefficient associated with ***BOONE*** represents a higher value in the case of

[38] See among others Berger and Bouwman (2013); Fiordelisi and Mare (2014); and Schaeck and Cihak (2014).

[39] This is based on the approach followed by the Bank of Albania, which divides the banks according to their relative market share. So, large banks are considered those banks that occupy a market share, which in terms of historical average has been relatively larger than 6% of the market. The rest are included in small banks.

large banks compared to that for small banks. This indicates that the link between competition and stability is stronger for this category of banks. Therefore, its effect is also expected to be greater in their case. This implies also that these banks are more sensitive towards patterns related to competition in the banking sector. Therefore, these patterns are expected to be more influential in their case. However, compared to the findings of Shijaku (2017c), it is noted that the magnitude of the coefficient associated with the Boone indicator has changed in both cases. On the one hand, its value is significantly higher in the case of large banks. This implies that in their case the link between competition and bank stability has been further strengthened. On the other hand, it is the smaller banks that exhibit a lower coefficient. This implies that the relation between these indicators is weakened in their case. Thus, the developments related to competition and banking stability have taken on an even more significant role in the case of large banks. Therefore, their sensitivity has also increased.

Another important information is also related to our attempt to address whether the link between competition and stability may be non-linear. The results of this analysis, as presented in columns [3] and [4] in Table 4 in Appendix A, show that the sign before the coefficient associated with $BOONE$ and $BOONE^{\wedge 2}$ does not change. Their coefficients are also insignificant from a statistical point of view given that their statistical probability value is greater than 10%. This means that the basic conditions for accepting a possible non-linear relationship between them are not met. This is another confirmation that we find no evidence that such relationship exist between competition and stability. This rejects the assumption of different authors that the relationship between them may be linear, at least in the case of the Albanian banking system. This result is different to the findings of Dushku (2016). This is another confirmation that implies that the financial crisis has changed the link between competition and banking stability from non-linear to linear. It continues to be linear as in previous studies[40] and despite expanding the time horizon in this paper. Such evidence is also found when the sample is split between small and large banks,

[40] Shih Shijaku (2017b); and Shijaku (2017c).

as reported in Table 5, columns [3] and [4] in the Appendix A[41]. This means that the theoretical assumption of "Moral Hazard" risk, associated with banks being too big to fail, that excessive competition beyond a certain level becomes detrimental to bank stability, thus turning the relationship between them into non-linear, does not hold.

Finally, the rest of the empirical results provide also important information to determine the degree to which bank stability is affected by macroeconomic conditions and factors related specifically with the behaviour of banks individually. In the case of the first group of variables, it is noted that their effect on bank stability remains relatively significant as in previous studies. The GDP coefficient exhibits a positive sign. This means that improving economic activity enhances bank stability. The coefficient related to primary sovereign risk, as proxy by *PSRISK*, is also statistically significant and has a negative sign. This implies that improving conditions associated with macroeconomic risks within the country has a positive impact on bank stability. This effect is found to be relatively stronger in the case of large banks. This means that this group of banks benefits more if macroeconomic conditions get better, and vice versa, if they get worse. However, compared to previous studies, the size of the coefficient is larger in case of both indicators. This proves that the sensitivity of banks toward developments related to macroeconomic conditions and risks to it has increased. Therefore, their impact on stability is expected to be higher. Their significant importance towards bank stability is also confirmed by the results related to the CRISIS indicator. The negative sign and its statistical significance prove that banks are affected also by the effects of the financial crisis. This effect has also been significant. However, the pass-through effects have been higher in the case of small banks given that the size of the coefficient in their case is the highest. On the other hand, other factors linked specifically with bank behaviour, such as their operational efficiency and capitalization, have been found to explain a relatively high proportion of bank stability patterns. The link between them is similar to those findings as in

[41] We have also used an alternative approach, e.i. the value of Boone in the power of three, to capture non-linear relationship between between competition and bank stability. Still, we find no supporting evidence of a non-linear relationship.

previous studies. The positive sign of the coefficients associated with these explanatory variables is another confirmation that bank stability condition increases by improving operational efficiency and a better capitalization of banks. However, their effect is found to be stronger in the case of small banks. This effect is also greater than what was found by Shijaku (2017c). This implies that their importance has increased and that small banks have given such indicators an increasing attention.

4.2 ROBUSTNESS CHECKS

This section enriches further the analysis of the relationship between bank stability and competition by presenting additional information related to the robustness checks of previous results. This approach enables us to reach also a more comprehensive conclusion. Therefore, this analysis relies on two different approaches. One approach relates to the use of four alternative synthetic indicators that are also suggested by existing literature. One of them relates to the $BOONE^{alt}$ indicator. It is based on the same theoretical assumption as our previous indicator, $BOONE$, but different from it includes also equity at the total cost function estimation process[42]. This means that it improves, thus, more the methodological aspect of quantifying competition among banks. The other variables are related to Lerner index [$LERNER$][43] and adjusted-Lerner index [$LERNER^{adj}$][44]. Similar to Boone indicator, $LERNER^{adj}$ index belongs also to the second generation of synthetic indicators proposed for measuring competition. In principle, this indicator reflects the same features as those associated with the Boone indicator. However, as Dushku (2016) suggests, one methodological difference in their case is related to the fact that an upward change in their values is expressed as a downward change in competition. Therefore, their effect is expected to be inversely related to $CAELS$. The latter indicator relates to profit elasticity

[42] For more details see equation B.1 and B.2 in Appendix B.

[43] Lerner index is calculated based on Fiordelisi and Mare (2014) according to the formula $LERNER_{it} = \frac{P_{i,t} - MC_{i,t}}{P_{i,t}}$. This indicato takes value from 0 to 1, where the lower values mean a higher degree of competition.

[44] This indicator has been used also by Kasman and Kasman (2015). For more details see also equation (B.3) in Appendix B.

[*PE*][45]. This is also an alternative synthetic indicator recently used to measure banking competition. This indicator, according to Boone and Van Leuvensteijn (2010), measures the change in percentages of bank profitability in response to a change in its operational efficiency. Therefore, it is assumed that the more competitive the environment, the greater the decline in profits due to a certain loss of efficiency. The results of this analysis are presented in Table 6 in Appendix A. The other approach reflects an expansion of the database considered for measuring bank stability. This new supplementary information relies on several different indicators on the quality of bank management[46]. This transforms our core stability indicator, ***CAELS***, into an even more comprehensive indicator such as ***CAMELS***. The rest of the methodological approach calculating and transforming it into a single synthetic indicator is the same as previously. Even in this case, the empirical analysis includes various competition indicators, whose results are presented in Table 7 in Appendix A. The similarity between these approaches is related to the fact that as before empirical analysis is based on the General Method of Moments. Instrument indicators are also approximated in the same way. So this method included the indicators used in the first equation with a time delay up to four lags.

Analysis of this section, generally, reflects the relative similarity to previous results. This does not change even if bank stability is expressed through ***CAMELS***. This enriches further our analysis of the link between competition and bank stability. The information presented supplements further the conclusions regarding the strength of the results. This enables us to reach an even more powerful conclusion. Their consistency strengthens further the conviction that the link between them is positive. This reaffirms our earlier conclusions that increasing competition, driven by improved efficiency, plays a positive role in banking soundness. This means that competition does not hurt bank stability. A detailed analysis of empirical results proves that $BOONE^{alt}$ has a positive sign as previously. Even its value is

[45] See also equation (B.4) in Appendix B. Moreover, see also Boone, et al. (2007); and Boone (2008).

[46] This category relies on the different information provided through the use of four indicators, such as the ratio of income to costs; the ratio of personnel expenditure to total expenditure; the ratio of personnel expenses to non-interest income; and the sum of total loans plus deposits to the ratio of personnel expenses.

statistically significant. The size, too, is relatively the same. At the same time, both *LERNER* and $LERNER^{adj}$ show a similar tendency. Their negative sign is accordingly to the theoretical expectations. Even their effect has been found to be statistically significant. On the other hand, the coefficient of PE is statistically significant. Therefore, it is very clear that the results generally remain the same as the findings analysed in the previous section, as all regressions show that the market power is negatively correlated with bank stability, which means that there is a positive relationship between the degree of higher competition and stability. This confirms once again the stability – competition view in the case of Albanian banking system.

5. CONCLUSIONS

The financial sector crisis that broke out in 2007 disrupted the structure and functioning of the banking industry around the world, in particular in those markets where banks have traditionally acted as intermediaries between investors and firms. Therefore, the developments that took place in this crisis have once again increased interest in studying the factors that determine banking stability, in particular issues related competition policies among banks. An increasingly competitive environment, due to globalization, liberalization of financial markets worldwide and merge and acquisition between banks, as well as the surge of non-bank agents that enable corporate financing, have often been seen as contributing to the tendency of banks towards greater risk-taking. In addition to the usual concerns, the issue of excessive competition among banks is of great importance to the banking sector, especially to bank fragility, due to its crucial role in non-financial activity. The theoretical perception of this challenge is even empirically confirmed. However, many theoretical articles have tried also to explain its clear advantages related to ease of access to borrowing costs, innovations and quality of financial services, financial system stability and, consequently, economic development. However, existing literature suggests that to address these important questions empirically properly it is necessary to use reliable measures of bank competition, as the more accurate these instruments are, the more accurate the empirical results will be.

This paper represents a further step in the verge of the other previous studies conducted using sample data on the Albanian banking sector. The aim is to fill in the information gap on the analysis whether competition improves or reduces the stability of banks operating in the Albania, focusing particularly on the period 2008 – 2017. As opposed to previous empirical works, this paper complements existing literature on this issue in two main directions. First, this study extends further the time horizon upon which empirical analysis of the nexus between them is based previously. This time horizon is greater even than that of previous studies focusing in particular on the post-financial crisis period. Therefore, the conclusions in this paper highlight better the effect of the exposure of bank stability to the consequences associated with this period. Second, in our best knowledge, this is the main panel data that uses the most appropriate indicators to measure bank stability and competition among banks. Both of them are synthetic indicators. The former is calculated as a single comprehensive indicator based on a unique banking system supervisory data collected by the Bank of Albania. The other indicator, linked to the Boone indicator, includes also the concept of operation efficiency. This new information allows us to understand how such advantages help them to become more competitive and thus gain relatively greater market share. This is so far the first study that the stability – competition nexus has been analysed empirically using these two indicators. Therefore, we believe this is an important step towards to understand better the underlying mechanisms related to them. Sensitivity of our estimated results is tested also by relying on other alternative indicators. This includes other indicators with regards to both of them. Even the fragmentation of the sample according to the size of the banks adds further supporting evidence to this analysis. This serves to address the problem of whether large banks are prone to the "too big to fail" moral hazard problem and whether the behaviour of larger banks is different from that of smaller banks. Finally, testing the non-linear relationship helps to determine whether the relationship between them has changed after the financial crisis. This serves to understand whether competition among banks is a concern for banking stability above a certain level.

The empirical results in the case of this study provide strong supportive evidence showing that the relationship between bank stability and competition is positive. Analysis supports, thus, the view that these indicators are directly linked. This means that increasing competition in the banking sector and promoting policies that push banks towards this tendency does not harm the solvency conditions of banks. Nor does it harm their soundness position and thus their stability. On the contrary, given the sampling period, an interesting point is the conclusion that developments associated positively with increased competition are relatively crucial to enhancing further bank stability, especially in times of crisis, as their supporting effect has been found to be also important. The methodological changes and the expansion further of the time horizon clarify the robustness of the results regarding this conclusion. On the other hand, the positive relationship between them is found to be similar in the case of both large and small banks. In the case of large banks the bond between them has become even stronger. This reinforces further the findings of earlier studies, in the case of the Albanian banking sector, that refute the claim that once a certain threshold is reached, a further increase in competition tends to promote excessive risk-taking incentives and the possibility of bank failure. This means that we find no evidences that would support the credible assertion that excessive competition promotes the "Moral Hazard" risk associated with banks become too large to fail in the case of Albanian banking system. This is confirmed also by the fact that our results do not support a U-shaped linear relationship between them after the financial crisis. It implies also that after the crisis the nexus between them has changed into a linear relationship, given that others authors have found previously evidences of a non-linear relationship before. Therefore, regarding the decision-making process and those dealing with these issues, it can be said that these results are thoughtful, not only for the stability of the financial sector, but also for the whole economy, as competition among banks should be the instrumental engine towards economic progress. This is also the appropriate market structure to further promote the stability of the financial system and all agents should make the most of it. Regarding other indicators, it is noted that macroeconomic conditions are also relatively important for the stability of banks. The results confirm that improving economic activity and reducing risks are associated positively with increasing bank stability. Similarly, bank stability is also

contingent on the need to improve the operating efficiency and banks' capital structure. However, their effect is noted to be stronger in the case of small banks.

Beyond the scope of this paper, future work should focus also on the fact that further research is necessary to build other alternative synthetic indicators, which would help us to capture properly other issues related to probability of default. This became an important issue during the recent financial crisis. Secondly, a great deal of attention should be paid also to the need to study the channels through which competition between banks affects bank stability. Even studying whether competition drives down the margins related to difference between price and cost is crucial to understanding whether this is the channel through which banks tend to greater risk. Finally, although this paper examines the stability – competition nexus, we ignore the fact that the banking supervisory system, also banks themselves, tend to associate excessive risk exposure with countercyclical and prudential measures, which in part minimises the negative effects in case of a possible failure. This is also why future research should consider also the possibility to include in the study an indicator related to the prudent behaviour of banks. This would serve to understand also how the stability – competition nexus changes.

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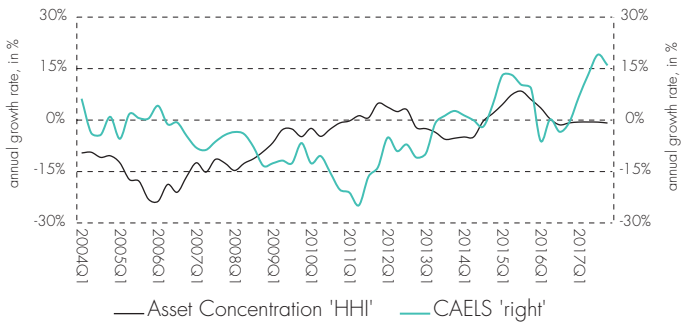
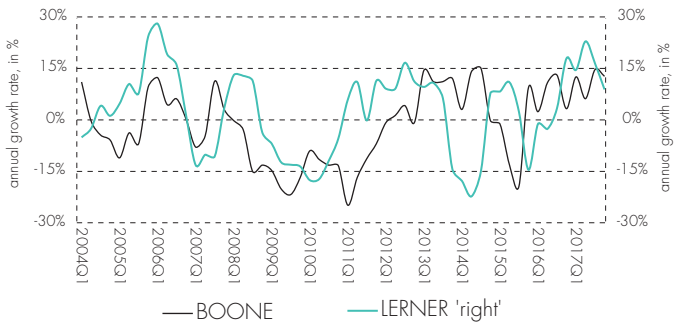
APPENDIX A

Chart 1 Bank competition and bank stability, 2008 -2017





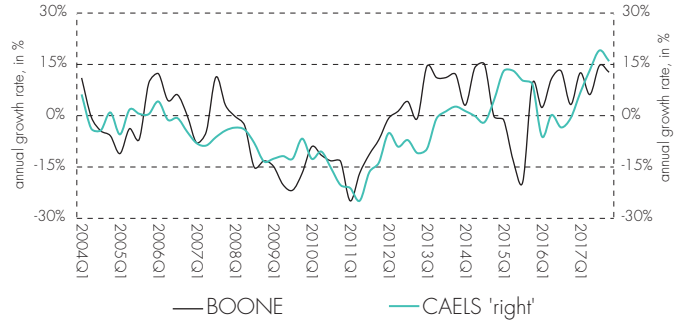


Table 1. Results of the estimated TCF model for the banking system in Albania.

Dependent Variable: TC Method: Panel Least Squares Sample: 2006 Q1 2017 Q4 [Periods included: 48] Cross-sections included: 16 [Total panel (balanced) observations: 768]				
TC=C(1)+C(2)*Q+0.5*C(3)*Q^2+C(4)*P1*P2+C(5)*P1*P3+C(6)*P2*P3+C(7)*Q*P1+C(8)*Q*P2+C(9)*Q*P3+C(10)*CRISIS+C(11)*TREND+0.5*C(12)*TREND^2+C(13)*TREND*Q				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.842	0.070	-26.1	0.00
C(2)	0.702	0.013	52.1	0.00
C(3)	0.012	0.001	8.5	0.00
C(4)	0.125	0.006	21.2	0.00
C(5)	-0.006	0.002	-3.3	0.00
C(6)	0.009	0.000	10.2	0.00
C(7)	-0.017	0.002	-11.1	0.00
C(8)	0.086	0.000	267.9	0.00
C(9)	-0.002	0.000	-10.7	0.00
C(10)	0.007	0.003	2.4	0.02
C(11)	0.004	0.001	3.0	0.00
C(12)	7.74E-06	2.57E-05	0.3	0.76
C(13)	-0.001	8.56E-05	-4.5	0.00
R-squared	0.999681	Mean dependent variable		8.141240
Adjusted R-squared	0.999674	S.D. dependent variable		1.512308
S.E. of regression	0.027303	AIC		-4.341939
SSR	0.431612	SIC		-4.245680
Log likelihood	1298.214	HQ		-4.304445
F-statistic	151054.4	DW statistic		0.508758
Probability (F-statistic)	0.000000			

Source: Author's Calculations

Table 2. Results of the estimated Boone indicator, for loan market in Albania.

Dependent Variable: MS Method: Panel Least Squares Sample: 2004Q1 2017Q4 [Periods included: 56] Cross-sections included: 16 [Total panel (unbalanced) observations: 784]				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.530	0.177	8.6	0.00
MC	-0.225	0.077	-2.9	0.00
CRISIS	0.018	0.142	0.12	0.90
R-squared	0.011254	Mean dependent variable		1.049670
Adjusted R-squared	0.008635	S.D. dependent variable		1.602471
S.E. of regression	1.595538	AIC		3.776248
SSR	1922.034	SIC		3.794576
Log likelihood	-1428.198	HQ		3.783307
F-statistic	4.296927	DW statistic		0.021330
Probability (F-statistic)	0.013945			

Source: Author's Calculations

Table 3. Panel Unit Root Test.

Variable	ADF - Fisher Chi²			PP - Fisher Chi²		
	Intercept	Intercept and Trend	None	Intercept	Intercept and Trend	None
CAELS	[0.000]	[0.000]	[0.000]	[0.002]	[0.000]	[0.000]
ΔGDP	[0.000]	[0.000]	[0.000]	[1.000]	[0.000]	[0.000]
ΔPSRISK	[0.000]	[0.000]	[0.000]	[0.000]	[1.000]	[0.000]
ΔBOONE	[0.000]	[0.000]	[0.000]	[0.000]	[1.000]	[0.000]
BOE	[0.000]	[0.000]	[0.965]	[0.000]	[0.000]	[0.896]
BFL	[0.000]	[0.001]	[0.000]	[0.000]	[0.001]	[0.001]

Note: Δ is a first difference operator. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Source: Author's calculations

Table 4. Empirical results on stability – competition nexus, in the case of Albanian banking system.

Dependant Variable [CAELS]	[1]	[2]	[3]	[4]
ΔGDP	1.026*	1.685**	1.477***	2.450*
ΔRISK	-0.063*	-0.053**	-0.046***	-0.089*
ΔBOONE	0.059**	0.039*	0.051**	0.058
ΔBOONE^2			0.198*	0.099
BOE	0.115**	0.199*	0.040	0.110
BFL	0.682*	0.701*	0.955*	0.585*
CRISIS		-0.246*		-0.251*
Cross-sections included	16	16	16	16
Instrument rank	16	16	16	16
Number of observation	624	624	624	624
J-statistic	12.2	10.2	12.0	8.4
Probability (J-statistic)	0.35	0.42	0.28	0.50
AR(1)	0.01	0.02	0.00	0.00
AR(2)	0.05	0.19	0.27	0.14

Statistical significance according to P-value at * 1%; ** 5%; and *** 10%.

Source: Author's Calculations

Table 5. Competition – stability nexus, large versus small banks.

Depended Variable [CAELS]	Large banks		Small banks	
	[1]	[2]	[3]	[4]
ΔGDP	2.773	2.772	1.877	1.257
ΔRISK	-0.133*	-0.140**	-0.094***	-0.086**
ΔBOONE[a]	0.195*	-0.061	0.179**	0.054
ΔBOONE^2		0.037		-0.024
BOE	0.021	0.004	0.403	0.260
BFL	0.270**	0.275**	0.407***	0.251
CRISIS	-0.183	-0.194	-0.242*	-0.210***
Cross-sections included	6	6	10	10
Instrument rank	24	24	10	10
Number of observation	234	234	390	390
J-statistic	24.8	24.0	0.80	0.75
Probability (J-statistic)	0.13	0.12	0.94	0.86
AR(1)	0.00	0.00	0.03	0.07
AR(2)	0.38	0.49	0.32	0.23

Statistical significance according to P-value at * 1%; ** 5%; and *** 10%.
[a] In the case of large banks this indicator is included in level based on the results of unit root test.

Source: Author's Calculations

Table 6. Robustness checks based on alternative indicators on bank competition.

Depended Variable [CAELS]	[1]	[2]	[3]	[4]
ΔGDP	1.340**	1.833*	1.267**	1.799*
ΔRISK	-0.032***	-0.070*	-0.083*	-0.071*
ΔBOONE[alt]	0.050**			
LERNER		-0.014		
LERNER[adj]			-0.350*	
PE				-0.087
EFICIENCY	0.235*	0.178*	0.174*	0.175**
LEVEVERAGE	0.690*	0.014	0.244	0.206**
CRISIS	-0.244*	-0.213*	-0.175*	-0.267
Cross-sections included	16	16	16	16
Instrument rank	16	16	16	16
Number of observation	624	624	624	624
J-statistic	11.0	8.5	7.4	6.3
Probability (J-statistic)	0.36	0.58	0.694	0.793
AR(1)	0.02	0.02	0.03	0.03
AR(2)	0.19	0.04	0.04	0.06

Statistical significance according to P-value at * 1%; ** 5%; and *** 10%.

Source: Author's Calculations

Table 7. Robustness checks based on the alternative stability indicator.

Depended Variable [CAMELS]	[1]	[2]	[3]	[4]	[5]
ΔGDP	1.991*	2.016*	2.140*	1.067*	2.076*
ΔRISK	-0.067*	-0.062*	-0.061*	-0.053*	-0.062*
$\Delta BOONE^{alt}$	0.078***				
LERNER		0.095***			
$LERNER^{adj}$			0.082***		
PE				-0.150	
EFICIENCY					-0.195**
LEVEVERAGE	0.147*	0.153*	0.220*	0.155*	0.129*
CRISIS	0.659*	0.568*	0.338**	0.391**	0.311*
Cross-sections included	16	16	16	16	16
Instrument rank	16	16	16	16	16
Number of observation	624	624	624	624	624
J-statistic	9.0	8.3	7.6	11.5	6.9
Probability (J-statistic)	0.53	0.60	0.67	0.32	0.73
AR(1)	0.03	0.02	0.04	0.01	0.03
AR(2)	0.55	0.73	0.81	0.70	0.91
Statistical significance according to P-value at * 1%; ** 5%; and *** 10%.					

Source: Author's Calculations

APPENDIX B

As a robustness test, we estimate an alternative measure of the marginal cost in the Boone indictor formula[47] following Leon (2015) and re-specify Equation (3) to include also additional control variable, namely bank capital. The specified model is expressed as follows:

$$lnTC_{it} = \alpha_0 + \alpha_1 lnQ_{it} + 0.5\alpha_2 (lnQ_{it})^2 + \sum_{j=1}^{3} \beta_j lnP_{it_j} + \sum_{j=1}^{3}\sum_{k=1}^{3} \delta_{jk} lnP_{it_j} * lnP_{it_k} + \sum_{j=1}^{3} \gamma_j lnQ_{it} * lnP_{it_j} + \tau_1 Trend + 0.5\tau_2 (Trend)^2 + \tau_3 Trend * lnQ + \omega_1 lnE_{it} + 0.5\omega_2 (lnE_{it})^2 + \omega_3 lnE_{it} * lnQ + CRISIS + \varepsilon_{it} \quad (B.1)$$

[47] The results are provided upon request.

Where, E_{it} is total equity of bank i at time t. This model is estimated based on the OLS approach. Then, assuming that inputs' prices are still homogeneous, Equation (4) is re-expressed as follows:

$$MC_{it} = \frac{TC_{i,t}}{Q_{i,t}}\left[\hat{\alpha}_1 + \hat{\alpha}_2 lnQ_{it} + \sum_{j=1}^{3} \hat{\gamma}_j lnP_{it\,j} + \omega_3 lnE_{it} + \tau_3 Trend\right] \qquad (B.2)$$

The most important finding, as reported in Table 5 in Appendix, is that the correlation between marginal costs calculated based on different approach have a relatively high level of correlation, which is also statistically significant. This means that changing methodology and augmenting the TCF model does not change the results and that banking sector in Albania exhibits competitive patterns. Following Clerides, et al. (2015) and Kasman and Kasman (2015) we estimated the efficiency adjusted Lerner index at the bank level, as follows:

$$Efficiency - LERNER_{i_t}^{adj} = \frac{\pi_{i,t} + TC_{i,t} - MC_{i,t} * Q_{i,t}}{\pi_{i,t} + TC_{i,t}} \qquad (B.3)$$

Where, $\pi_{i,t}$ is the profit of bank i at time t, and other are as previously defined. Similar to the conventional Lerner index, the Adjusted Lerner index also ranges from 0 to 1, with larger values implying greater market power. Then, Clerides, et al. (2015) measure the profit elasticity by deriving from the efficiency adjusted Lerner index by solving for π in equation (B.3) and differentiating with respect to MC, as follows:

$$Profit\ Elasticity_{it} = \frac{Q_{i,t} * MC_{i,t}}{Q_{i,t} * MC_{i,t} - TC_{i,t} * (1 - LERNER_{i_t}^{adj})} \qquad (B.4)$$

Hence, the efficiency adjusted Lerner index and the profit elasticity are two closely related concepts.

CIP Katalogimi në botim BK Tiranë

Shijaku, Gerti
Bank stability and its relationship with competition among banks after global financial crisis : new evidences from Albanian banking sector / Gerti Shijaku. – Tiranë : Banka e Shqipërisë, 2020
64 f. ; 21X15 cm.
Bibiliogr.
ISBN 978-9928-262-32-5

1.Banka dhe veprimtaria bankare 2.Banka e Shqipërisë
3.Politika fiskale 4.Shqipëri

336.71(496.5)

ISBN 978-9928-262-32-5

www.bankofalbania.org

ISBN 978-9928-262-32-5