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Are Capital Ratios Procyclical? Evidence from Turkish Banking Data

Abstract: This paper contributes to the literature by providing recent empirical evidence about the positioning of the capital adequacy ratios (Basel II capital adequacy ratio and leverage ratio as proposed by Basel III) of Turkish banks and the business cycle. As in many emerging countries, the Turkish real sector is highly dependent on the banking loans for financing, and consequently, the macroeconomic system is vulnerable to the supply of bank loans. The results reveal that the Basel II capital adequacy ratio of Turkish banks is procyclical at a statistical significance in normal and crisis times. The results of cyclicality tests of the leverage ratio are mixed: if nominal GDP growth is taken as a business cycle indicator, it is procyclical; however, the credit-to-GDP gap signals countercyclical leverage ratios in normal times. In crisis times, the leverage ratio of the Turkish banking system is determined to be countercyclical.

Key Words: Capital, capital adequacy ratio, leverage rate

JEL Classification: G21

1. INTRODUCTION

The analysis of King and Levine (1993) was the first to establish causality from finance to economic growth in a cross-country regression context, and indicated that initial levels of financial depth – as measured by the size of the banking system relative to GDP – could trigger growth in subsequent periods. The two-way positive link between financial development and growth has been analysed by several researchers across regions, countries, and income levels (Barajas, Cha-

mi, and Yousefi, 2013; Nili and Rastad, 2007; Khan, Senhadji, and Smith, 2001). However, recent studies indicate that there is a significant, bell-shaped, relationship between financial development and growth, a situation described as the "too much finance" effect (Arcand, Berkes, and Panizza, 2012).

In favour of this approach, in their study prepared for the Bank for International Settlements (BIS) – employing data from 50 advanced and emerging-market economies for 1980–2009 – Cecchetti and Kharroubi (2012) determined that beyond a certain level, financial deepening is associated with slower rather than faster growth. Law and Singh (2014) found a similar effect in the relationship between GDP growth and the size of the financial sector. Fabris (2018) underlined the dilemma arguing whether monetary policy should only be concerned with price stability or it should use its instruments and tools to support other objectives as well, such as economic growth. A literature review concluded that although there is a wide range of studies on the relationship between monetary policy and economic growth, the nexus between the two remains inconclusive (Twinoburyo and Odhiambo, 2017)

Although financial systems in emerging markets have deepened substantially in recent decades, most remain below the levels reached in advanced economies. As of 2013, outstanding private credit accounted for close to 50 percent of GDP in average emerging markets, and more than 130 percent of GDP in advanced economies, despite the deleveraging process that has taken place since the 2008 global financial crisis (Sahay et al., 2015, p.6). It is a fact that emerging economies have rebounded more quickly and sharply from the crisis; the reasoning may lie in the moderate depth of their banking sectors. Even so, efficient and stable banking systems are essential for emerging markets to achieve long-term balanced development, and to absorb various types of shocks. By this route, the manual has become rule-based regulation as imposed by international institutions such as BIS. Within this framework, the capital adequacy of the banking system in particular has been the focus of concern since the 2000s, gaining additional importance after the 2008–2009 crises. The principle-based approach to capital and liquidity requirements for the financial institutions of the U.S. Treasury can be summarized in three principles: (1) Capital requirements should be designed to protect the stability of the financial system, not just the solvency of individual banking firms; (2) Capital requirements for all banks should be increased from present levels, and should be even higher for financial firms that pose a threat to overall financial stability; (3) Banking firms should be subject to a simple, non-risk-based leverage constraint and also to a conservative, explicit liquidity standard (Prasad, 2011, p.7).

Basel I was the first of the international standards specifying the minimum amount of capital a bank must have in relation to its assets, and it was published in 1988. This standard eventually developed into Basel II – published in its first form in 2004 – which took greater consideration of the risks with which a bank's different assets are encumbered. Basel II has aimed to align the minimum capital requirement on account of credit risk, market risk and operational risk. The options for calculating the capital charge for credit risk are the standardized approach and internal ratings-based approaches (IRB). The three options for calculating operational risk are the basic indicator approach, the standardized approach, and the advanced measurement approach. A similar structure applies for the measurement of market risk.

However, the financial crisis of 2008–2009 revealed that even revised, the risk-sensitive approach of Basel II was not adequate to secure the banking system`s resilience to financial stress. Even the weights applied to asset categories when calculating the denominator of the Basel II capital adequacy ratio had failed to precisely reflect the portfolio risk (Acharya and Richardson, 2009; Vallascas and Hagendorff, 2013). Based on the lessons of the latest financial crisis, the capital adequacy regulations of banking were revised into Basel III, to be completely implemented no later than by 2019.

The relationship between the business cycle and the capital adequacy of the banks operating in many different countries has been investigated by many researchers. Each country has its own peculiarities in terms of economic dynamics and the configuration of its financial sector. The results of these studies have contributed not only to the academic literature but also highlighted the public authorities when deciding about economic and financial operating and regulatory policies. This paper contributes to the literature by providing recent empirical evidence about the positioning of the capital adequacy ratios (the Basel II capital adequacy ratio and the leverage ratio as proposed by Basel III) of Turkish banks and the business cycle. As in many other emerging countries, the Turkish real sector is highly dependent on banking credits for financing, and consequently, the macroeconomic system is vulnerable to the supply of credits. On the regulatory side, after its own financial and banking crisis in 2000–2001, the banking system was restructured to make it less vulnerable to external shocks, including the 2008–2009 global financial crisis. The effects of external shocks seem to have become more indirect, coming through real sector debt-paying ability. On the ownership side, as of December 2015, Turkey's banking sector was comprised of 34 deposit banks, 13 development and investment banks, and 5 participation banks, with 11 of these holding significant foreign

capital.[1] There is a limited number of studiesanalyzing the capital adequacy of the Turkish banking system and its relationship with business cycles, many of which have concentrated on capital buffers.[2] Asarkaya and Özcan (2007) found that lagged capital, portfolio risk, economic growth, the average capital level of the sector and return on equity are positively correlated with the capital adequacy ratio in the Turkish banking system. To the best of our knowledge, this is the first paper in this literature that takes into account the relationship between the capital adequacy ratios of Turkish banks and business cycles.

The results of this study reveal that, in the Turkish banking system, the Basel II capital adequacy ratio is procyclical in normal and crisis times. The results of cyclicality tests of the leverage ratio are mixed: if nominal GDP growth is taken as a business cycle indicator, it is procyclical, however the credit-to-GDP gap signals countercyclical leverage ratios in normal times. In crisis times, the leverage ratio of the Turkish banking system is determined to be countercyclical.

The remainder of this paper is organized as follows: The next section describes the problem of procyclicality versus the targeted countercyclicality of banking sector capital requirements. Section 3 describes the data and some facts about banks' ratios together with the regulatory structure of the Turkish banking system from a historical perspective. Section 4 presents the econometric model and the hypothesis and Section 5 reports the main results on both capital ratios over the business cycle. The last section reports the conclusion.

2. PROCYCLICAL VERSUS COUNTERCYCLICAL CAPITAL REQUIREMENTS

Although the Basel II Accord provided a well-defined framework to fully align portfolio risks and capital charges, the procyclicality of new capital requirements has been questioned by many practitioners and researchers. The procyclicality of capital requirements has gained importance, referring to its contributions to the business cycle, which means that capital charges decrease when economy is expanding and increase during recession (Allen, 2004; Kashyap and Stein, 2004; Danielsson et al., 2001; Kashyap and Stein, 2004; Repullo and Suarez, 2012; Gordy and Howells, 2006; Panetta et al., 2009).

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[1] http://www.invest.gov.tr/en-US/infocenter/publications/Documents/FINANCIAL.SERVICES.INDUSTRY.pdf

[2] For the relevant literature see Atici, G. and Gursoy, G. (2011); Atici, G.and Gursoy, G. (2012); Binici, M. and Köksal, B. (2012); Caliskan, A. (2011).

Empirical analysis about the relationship between business cycle variables (growth rate of nominal and/or real GDP, growth rate of total credit to the private non-financial sector and credit gap, etc.) and the capital adequacy of the banking system can be grouped into two approaches. The first approach analyses the effects of the capitalization of banks on lending across business cycle fluctuations, and proposes that low-capitalized banks are forced to cut their loan supply during a recession, thereby worsening the recession (Peek and Rosengren, 1995; Gambacorta and Mistrulli, 2004). The second approach focuses on capital buffers and their positioning in business cycles, and indicates that banks expand their loan portfolios in a boom without enhancing their capital, and consequently they cannot absorb the materializing credit risks in recessions without reducing lending. The negative relationship between the business cycle and the capital buffers of banks has been determined by Ayuso et al. (2004), examining the Spanish banks; Lindquist (2004), regarding Norwegian banks; Stolz and Wedow (2005) on German banks; Tabaket al. (2011) examining Brazilian banks; Coffinet et al. (2011), examining French banks; Deriantino (2011), examining banks within the Association of Southeast Asian Nations (ASEAN); and Karmakar and Mok (2013), examining US commercial banks. Jokipii and Milne (2008) determined a similar negative relationship for the 15 countries of the European Union in 2004, but an opposite relation for the 10 countries that joined European Union in 2004.

Both approaches indicate the risk of deepening a recession by reducing lending when banks are low-capitalized in booms, as opposed to the countercyclical capital buffer[3] requirement of Basel III, which requires the regime to "help to reduce the risk that the supply of credit will be constrained by regulatory capital requirements that could undermine the performance of the real economy and result in additional credit losses in the banking system."[4]

3. DATA - TURKISH BANKING SYSTEM

As of December 2015, in the Turkish banking sector there are 50 banks in total, 32 of them being deposit, 13 development and investment and 5 of them participation banks. Banking Law No. 5411 defines a deposit bank as an institution operating primarily for the purposes of accepting deposits and granting loans in their own names and for their own accounts. The definition of a participation

[3] The Basel III counter cyclical capital buffer is calculated as the weighted average of the buffers in effect in the jurisdictions to which banks have credit exposure as an extension of the capital conservation buffer

[4] http://www.bis.org/bcbs/ccyb/

bank is an institution operating primarily for the purpose of collecting funds through participation accounts and granting loans under Islamic financing principles. The development and investment bank is defined as an institution operating primarily for the purposes of granting loans and/or fulfilling the duties assigned thereto by their special laws. While 13.6 percent of banks' paid-in capital is traded in Borsa Istanbul, 53.4 percent belongs to residents and 33 percent belongs to non-residents. As of June 2016, banking sector total assets have reached 2.48 trillion TL (859 billion US dollars). Loans account for 64 percent of total assets, amounting to 1.58 trillion TL (549 billion dollars). Deposits account for 53 percent of total liabilities, amounting to 1.31 trillion TL (455 billion dollars).

In the period after the 2000–2001 financial crisis in Turkey, structural reforms designed to ensure the banking sector could overcome fragilities became the engine of economic growth and accelerated the resolution of the crisis. In the 2000s, autonomous Regulatory and Supervisory Agencies (Boards) were established, one of which was the Banking Regulation and Supervision Agency (BRSA). The Banking Sector Restructuring Program was announced in May 2001, and it focused on the intermediation function aiming to make the banking sector internationally competitive and resilient to internal and external shocks. The restructuring program consisted of four main building blocks: (1) Restructuring public banks financially and operationally; (2) Prompt resolution of banks under supervision; (3) Bringing a healthy structure to private banks which were affected negatively by the crisis; (4) Realizing legal and corporate regulations to increase the effectiveness of surveillance and supervision in the banking sector in order to bring a more effective and competitive structure to the sector.[5] Additionally, a new regulation was formed in order to build accounting standards according to international criteria of financial reporting, and the Turkish Accounting Standards Board was established in 2002 with the major aim of ensuring the comparability of financial data at an international scale. On accounting and reporting applications, Turkish banks have been required to use the IFRS since 2006 under the regulation of the BRSA. Furthermore, in 2011, the Public Oversight, Accounting and Auditing Standards Authority (POA) was established and granted the authority to set and to issue Turkish Financial Reporting Standards (TFRSs) that are in full compliance with the IFRS, and to determine the application scope of those standards.[6]

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[5] www.bddk.org.tr/WebSitesi/english/Reports/Working_Papers/8675from_crisis_to_financial_stability_turkey_experience_3rd_ed.pdf

[6] http://www.ifrs.org/Use-around-the-world/Documents/Jurisdiction-profiles/Turkey-IFRS-Profile.pdf

Table 1: Ownership stucture in the turkish banking system

	Total Number of Banks in 2000	Total Number of Banks in 2015	Total Number of Banks in Analysis
Deposit Banks	61	32	
State-owned	4	3	3
Private	28	8	5
Foreign	18	21	11
Development & investment banks	18	13	
State-owned	3	3	2
Private	14	6	1
Foreign	2	4	-
Participation banks	-	5	
TOTAL	79	50	21

Source: Turkish Bankers Association (18.02.2016)

Under these circumstances, the number of banks in the system diminished gradually from 79 in 2000 to 50 in 2015, as can be seen from Table 1. In the analysis, banks with available data since 2001 were chosen, so the data set contains 21 banks. Nevertheless, the sample size seems representative of the whole banking sector, as this group of banks comprises 94 percent of total assets, 95 percent of total credits and 96 percent of total deposits in the Turkish banking system as of the end of 2015. In such an environment, Bulut (2016) reports that the CBRT takes into consideration 12-month ahead inflation expectations, rather than or 24-month ahead inflation expectations while steering interest rates.

In the analysis, two types of capital ratios are considered: (1) the Capital to Risk-weighted Assets Ratio (TIER 1/ Risk-weighted Assets), and (2) the new Basel III Leverage Ratio. The first capital adequacy ratio takes into account on-balance and off-balance sheet exposures as weighted according to risk based on regulatory requirements (BCBS, 1988, 2005). The new leverage ratio has a broader perspective on exposure, and in the denominator there exist derivative exposures and securities financing transaction exposures, in addition to on-balance sheet and off-balance sheet exposures (BCBS, 2014).

Figure 1 shows the average of the capital adequacy ratio and leverage ratios of selected Turkish banks, as weighted according to asset size after 2001. The sharp increase in capital adequacy ratio (CAR) after 2001, which reached its highest level in 2003, was attributed to the increase in net current income and in the free capital (shareholders' equity-permanent assets–non-performing loans af-

Figure 1: Car and leverage ratios of turkish banks: 2001-2015

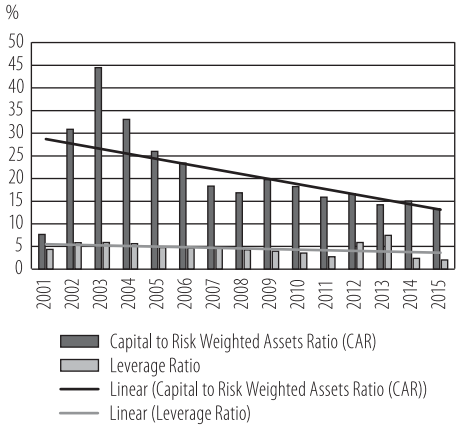
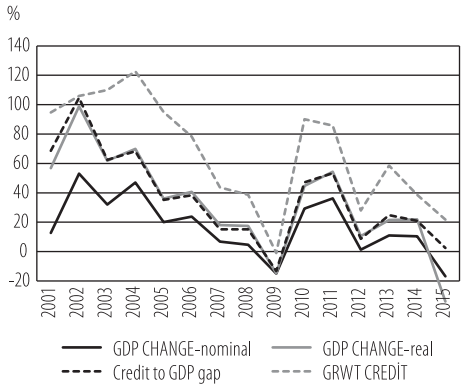


Figure 2: Business cycle indicators in turkish economy



ter provisioning) of the banks.[7] However, as can be seen from Figure 1, the weighted average CAR ratio level experienced a considerable decline in 2008, and there exists a negatively sloped trend. On the front of the leverage ratio, which takes into account all of the risk exposure of the banks, there exists a nearly constant trend. The downward movement after 2009ended up below 5 percent in 2015 (the required level is 4 percent).

In the analysis, the procyclicality of both capital ratios is measured against four business cycle indicators: the annual growth rate of nominal GDP (expressed in national currency), the annual growth rate of real GDP, the credit-to-GDP gap (the difference between the credit-to-GDP ratio and its trend as defined by BIS and specified as a useful early warning indicator of financial crises), and the annual growth rate of total credit to the private nonfinancial sector (expressed in national currency), as parallel to Brei and Gambacorta (2015). Figure 2 clearly shows the business cycle developments since 2001.

ECONOMETRIC MODEL

In the analysis, the aim is to test the behaviour of the capital ratios during the business cycle. In order to differentiate the cyclical properties, a dummy variable of C_t is used in the analysis, which is set as 1 for 2001 (the year of the domestic

[7] http://www.tbb.org.tr/english/book2003/turkisheconomy.pdf

financial crisis) and 2008 (the year of the global financial crisis) and as 0 for all the other years, in addition to other regression variables. The model of Ayuso et al. (2004), as modified by Brei and Gambacorta (2015), is additionally modified for use with the following dynamic panel regression:

$$L_{i,t} = \alpha_i + \phi C_t + (\beta + \beta^* C_t) L_{it+-1} + (\delta + \delta^* C_t) X_{it-1} + (\mathcal{X} + \mathcal{X}^* C_t) Y_{it} - y\, IFRS_{it} + \varepsilon_{it}$$

L_{it} denotes the risk-weighted capital adequacy ratio and leverage ratio in the period t of bank i. The lagged dependent variable L_{it-1} is added to the model to test whether adjusting costs for changing the capital level, such as new equity issuance costs – as well as costs related to the problem of asymmetric information in capital markets – is relevant. The sign of this dependent variable is expected to be positive. The bank-related variable X_{it-1} shows the direct costs of remunerating the shareholders and the risk profile of individual banks. Its expectedsign is negative. Y_{it} represents business cycle-related variables to determine their effects on both numerator (level of capital) and denominator (level of risk-weighted assets or total exposure). α_i represents the effects of time-invariant bank-specific fixed effects as proposed by Lemmon et al. (2008) and Gropp and Heider (2010). The variable named $IFRS_{it}$ is also such a dummy variable, as the IFRS has been applied by Turkish banks since 2005; the value of the variable is 1 for the period of 2005–2015 and 0 for 2001–2004.

The bank-specific factors vector contains data indicating bank size (log of total assets), profitability as measured by ROA, the ratio of non-performing loans (NPL) to total loans as a measure of credit risk and the credit-to-total-assets ratio in order to capture the portfolio positioning of individual banks. The aforementioned bank characteristic indicators are lagged one year in order to mitigate a possible endogeneity problem between them and both of the capital ratios.

There are different findings in the literature as to signs of size (total assets) on CAR or leverage. The sign of size on CAR is found as negative and statistically significant by Okuyan (2013), and as negative but insignificant by Buyuksalvarci and Abdioglu (2011). Gropp and Heider (2010) found a positive and significant effect of size on leverage ratios, while Allen et al. (2013) and Juca et al. (2012a) found a negative effect of size on leverage. Finally, Romdhane (2012) and Aktaş et al. (2015) found a negative and significant effect of size on capital ratio.

Basically, from an accounting perspective profits realized in time t-1 should contribute to capital through retained earnings, so profitability as measured by ROA is expected to have a positive impact on capital adequacy ratios, as found by Aktaş et al. (2015), Buyuksalvarci and Abdioglu (2011) and Okuyan (2013).

However, Gropp and Heider (2010) found a negative and significant, and Allen et al. (2013) found a negative but insignificant relationship.

On the NPL side, Dong et al.(2012) found a significant negative correlation between the discretionary loan loss provisions and capital adequacy ratio (CAR). This negative relation can be interpreted from an accounting perspective: a high non-performing loan tendency signals increasing credit risk, which causes CAR to diminish at time *t*.

In their analyses, Ayuso (2004) and Brei and Gambacorta (2015) did not include NPL ratio or ratio of total credits to assets as independent variables, however it is thought that as the credit-to-GDP gap and credit growth areconsidered to be business cycle indicators, the NPL ratio and the ratio of total credits to assets should be included in the analysis to reflect credit movements and their related results to the banking system. This addition can be regarded as a contribution to the model.

Some studies have attempted to define the variables signalling business cycles in the Turkish economy. Naturally, real and/or GDP is an indispensable variable (see: Sarikaya and Auroba, 2013, Insel et al., 2004). Under the heading of financial indicators, bank loans to the real sector gained popularity. In her study, Yigitbas (2014) found a long-run equilibrium relationship between real bank loans and macroeconomic variables, including GDP, and it is determined that the response of bank loans to GDP shocks is positive. In relation to the credit-to-GDP gap, Günay and Kılınç (2011) determined that credit-to-GDP ratio decrease occurred in tandem during a crisis.

In the analysis, the following two hypotheses are tested: (1) How did the risk-weighted capital adequacy and leverage ratios of Turkish banks react to the business cycle? (2) Did those effects change in response to the financial crisis? In order to test the hypothesis, the generalized method of moments (GMM) estimator for dynamic panel data is employed, as it tends to outperform the difference GMM estimator in terms of consistency and efficiency. The coefficient estimates of the two-step system estimator are used as they are asymptotically more efficient compared to those of the one-step system estimator, as reported by Arellano and Bond (1991) and Blundell and Bond (1998).

5. THE RESULTS

The summary statistics given in Table2 reveal some structural characteristics of the Turkish banking sector, as the sample of banks comprises94 percent of total assets, 95 percent of total credits and 96 percent of total deposits as of the end of 2015. The first indication is that the Turkish banking system is well-capitalized in terms of the Basel II capital adequacy framework.[8] However, the publicly owned banks holding nearly 32 percent of the banking sector have an unreasonably high capital adequacy, raising the question of misuse of public resources. The average capital ratios of foreign banks are the lowest, despite their comparative advantage in terms of cost of capital. The Turkish banking regulation ruled that the leverage ratio as defined in Basel III will be tested at a minimum level of 3 percent during the parallel run period (i.e. from 1 January 2013 to 1 January 2017). Table 2 shows that, on average, the leverage ratio of the Turkish banking system is above the requirement, however the average ratio of foreign banks seems problematic. The over-capitalization of public banks can also be observed from the reported leverage ratio in Table 2.

The average profitability of the Turkish banking sector in the period of 2001–2015 was 1.41 percent when evaluated using ROA, and this figure seems more than satisfactory when compared to average ROA statistics for the EU and USA.[9] Despite being overcapitalized, public banks seems more profitable, with a mean ROA of 1.928 percent. However, the highest standard error (4.360) as compared with other groups can be attributed to their historical approach of supporting the economic mission of the government, such that before 2001, when they were financing the public through security investments. Nowadays some strategically selected sectors, such as construction – especially big infrastructure investments – are financed by public banks. The foreign banks, which are less capitalized when compared to other groups, also have a lower ROA (1.107 percent), which can be attributed to adverse selection for non-residents, as many foreign banks have foreign trade names. Non-performing loans, as a percentage of total loans, were 7.381 percent on average in the period of 2001–2015, with a downward trend since 2001.

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[8] The total capital adequacy ratio is set at a rate of 8percent of risk-weighted assets. Banks must hold common equity Tier I capital of at least4.5percent and additional Tier I capital of at least1.5 percent, with the remaining 2 percent being Tier II capital. Furthermore, the BRSA currently imposes a 4 percent additional capital requirement to Turkish banks as a prudential requirement.

[9] https://www.ecb.europa.eu/pub/fsr/shared/pdf/sfbfinancialstabilityreview201505.en.pdf?01bdfc8080116dda4a9771f1c4958df7

The unobserved panel-level effects are correlated with the lagged dependent variables, making standard estimators inconsistent. The GMM estimator method of Arellano and Bond (1991) and Bond (1998) is designed for datasets with many panels and few periods, and it requires that there should be no autocorrelation in the idiosyncratic errors. The output of the analysis presented no significant evidence of serial correlation in the first-differenced errors at order 2. The AR(2) s for each estimation are given at the bottom of the tables.

The results of the longitudinal panel regression built to determine the relation between both capital ratios of Tier1/RWA and leverage ratio and the business cycle variables are given in Table 2a and Table 2b, respectively, and in normal times. The logic of interpretation is that a negative sign of a business cycle variable indicates the countercyclicality of capital ratios, which means capital ratio decreases when the business cycle is improving. On the contrary, capital ratios are said to be procyclical if the sign(s) of business cycle variables are positive.

Basel II Capital Adequacy Ratio in Normal Times

Referring to Table2a, in normal times, the Tier1/RWA ratio is significantly procyclical, referring to the positive signs of coefficients of business cycle variables except the credit-to-GDP gap. All of the coefficients are statistically significant even at a 99 percent confidence level.

The evaluation of bank-related variables reveals some interesting results. There is strong evidence of the persistence of Basel II capital ratios, as indicated by the positive and significant coefficients of the lagged variables pointing to short-term capital adjustment costs. This finding is parallel to the finding of Brei and Gambacorta (2015, p.15). The profitability of the banks, as measured by ROA, has a positive relation with the Basel II capital adequacy ratio, and the coefficients are statistically significant, pointing to additions to capital through retained earnings. As the coefficients of asset size in normal times are generally positive, the "too-big-to-fail" hypothesis is not supported in the Turkish banking system in normal times. This is not surprising, as overcapitalized public banks dominate more than 30 percent of the system. The positive relation and statistical significance of the coefficient for a non-performing loans ratio can be attributed to conservative policies for monitoring the repayment performance and provisioning. The negative and relatively significant (at a 95 percent level) sign of the coefficients of the loans-to-assets ratio may indicate that as the risk weight of domestic

loans, in calculating RWE, is generally more than 100 percent,[10] the increase in loan amounts makes the ratio lower.

Leverage Ratio in Normal Times

The results given in Table2b are mixed: according to credit-to-GDP gap, the leverage ratio is countercyclical, but according to nominal GDP growth it is procyclical. The leverage ratio does not respond to real GDP growth and credit growth indicators in normal times. The leverage ratio does not respond to the other two business cycle indicators. The lagged leverage ratio is persistent, as indicated by the positive and significant coefficients pointing to short-term capital adjustment costs. There exists a positive relation between the leverage ratio and ROA, pointing to increasing Tier1 capital through retained earnings. As the positive relation of asset size with the Basel II ratio is reversed for the leverage ratio, that the too-big-to-fail hypothesis holds in the case of exposure of all banks is a point of interest. Such a reversal is also realized for the relation between leverage ratio and loan-to-asset ratio, indicating that more capital is required in cases where the loan-to-asset ratio is increasing. The relation with NPL is mixed not only in terms of the sign of the coefficients, but also in terms of the statistical significance of the results when the business cycle indicator is changed.

The economic significance of the coefficients in relation to leverage ratio states that referring to the coefficient of nominal GDP growth given in Table 2b – which is 0.010 at a 99 percent confidence level – as nominal GDP increases with its average growth rate of 14.5 percent (Table 1), the leverage ratio increases by 0.14 percent (0.010*15.4) on impact and 0.84 percent (0.14/(1-0.827) in the long run, with the condition of a steady state. Relative to the average leverage ratio of 5.36 percent, this implies an increase in the leverage ratio of 2.71 percent (0.14/5.36) in the short run and 15.71 percent (0.84/5.36) in the long run. The economic significance analysis results diverge from the findings of Brei and Gambacorta (2015, p.16), and of Repulloet al. (2010). The expected decrease in average leverage ratio in the Turkish banking system, after a considerable decrease of 17.4 percent in nominal GDP, is lower than the values they reported. This may stem from the concentration of this analysis on only the Turkish banking system, as their study involved a broad spectrum of countries and banking systems.

[10] https://www.bddk.org.tr/websitesi/turkce/Mevzuat/Bankacilik_Kanununa_Iliskin_Duzenlemeler/12795bankalarin_sermaye_yeterliliginin_olculmesine_ve_degerlendirilmesine_iliskin_yonetmelik_ek_1.pdf

Basel II Capital Adequacy Ratio in Crisis Times

Referring to Table 3a, the only business cycle indicator – the coefficient of which is statistically significant – is the credit-to-GDP ratio, which stipulates that the Basel II capital ratio of the Turkish banking system is procyclical in crisis times. This finding is in line with the results of Brei and Gambacorta (2015, p.31). Although not statistically significant, the coefficients of the other three indicators are negative, signalling the countercyclicality of the capital ratio. The capital ratio is persistent, as indicated by the positive and significant coefficients pointing to short-term capital adjustment costs. With the exception of the NPL ratio, the signs of the coefficients of bank-related variables have not changed in crisis times: positive coefficients for ROA and asset size, and negative coefficients for loan-to-asset ratio, IFRS and ownership type. The change in the sign of the NPL ratio may stem from the diminishing effects of realized loan losses in the capital adequacy ratio.

Leverage Ratio in Crisis Times

Referring to Table 3b, all three of the statistically significant coefficients of business cycle indicators stipulate that the leverage ratio is countercyclical in crisis times in the Turkish banking system. The leverage ratio does not respond to the credit-to-GDP gap. There is strong evidence regarding the persistence of the leverage ratio as indicated by the positive and significant coefficients of the lagged variables, pointing to short-term capital adjustment costs.

6. CONCLUSION

The historical developments show that in a banking system where the capital requirements have procyclical effects, recovery from recessions has been slower because of the reluctance of banks to lend. In a recessionary economy, defaults on loans spread, bank profits diminish and equity-generating opportunities are sluggish; all of these contribute to the lowering of capital adequacy ratios even below regulatory requirements. In order not to be caught by a recession in such a situation, banks should keep capital buffers, which themselves come with attached costs. Countercyclical capital regulation is intended to address the problems caused by procyclical micro-prudential capital regulations. Countercyclical regulations developed by BIS under Basel II aim at increasing the capital ratios of banks in normal times so that they can absorb losses during recessions, even allowing them to continue to lend.

Within this framework, the BIS issued its final guidance for implementing countercyclical capital requirements in 2010. These requirements are planned to be in the form of a buffer of 0–2.5 percent above the minimum regulatory capital requirements. Every member is required to designate an authority that would use its own judgment regarding the size of the buffer and the timing of its introduction and release. In order to build up a more stimulating banking system, each country should determine its positioning around the cyclicality of banking sector capital.

In this study, a longitudinal panel regression analysis was performed with annual data from Turkish banking system in the period between 2001 and 2015. First and foremost, it should be noted that the Turkish banking system is well-capitalized, as the average capital adequacy ratio is nearly 15 percent as at end-September 2015. The Turkish Banking Supervision Agency plans to implement Basel III rules by 2019. The unreasonably high level of capital ratios as compared to many other countries is not the subject of analysis in this study, but it is thought that it should be analysed from a broad perspective, with its benefits and costs to the general economy taken into account in the calculation dynamics of both capital and risk-weighted assets.

The results of this study reveal that the Basel II capital adequacy ratio of Turkish banks is procyclical at a statistical significance in normal and crisis times. The results of cyclicality tests of the leverage ratio are mixed: if nominal GDP growth is taken as a business cycle indicator, it is procyclical; however, the credit-to-GDP gap signals countercyclical leverage ratios in normal times. In crisis times, the leverage ratio of the Turkish banking system is determined to be countercyclical.

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Table 1: Summary Statistics – Turkish Banking Sector & By Type (2001–2015)

	TOTAL			PRIVATE			FOREIGN			PUBLIC		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Tier1/ RWA	294	24.946	23.271	70	23.759	12.059	154	17.004	7.334	70	43.606	39.236
Tier1/ Total Exposure	294	5.357	7.057	70	5.475	4.925	154	3.365	2.475	70	9.623	12.095
ROA	294	1.408	3.128	70	1.55	1.608	154	1.107	2.962	70	1.928	4.360
Logarithm of Total Assets	294	7.134	0.762	70	6.979	0.881	154	7.149	0.689	70	7.255	0.772
NPLoans-to-Total Loans	294	7.381	12.104	70	4.004	5.146	154	6.276	7.562	70	13.190	20.502
Loans-to-Assets	294	50.150	18.578	70	44.263	17.047	154	52.453	16.316	70	50.972	23.175
Ownership	294	1.680	0.814	70	1	0	154	2.234	0.975	70	2.	0
IFRS	294	0.714	0.452	70	0.714	0.452	154	0.714	0.452	70	0.714	0.452
Growth Rate of Nominal GDP	294	14.521	13.621									
Growth Rate of Real GDP	294	2.916	8.093									
Credit-to-GDP Gap	294	2.609	9.703									
Growth Rate of Credits	294	30.916	16.092									

SOURCE: Turkish Bankers Association data base, Central Bank of Turkey data base

Table 2a: The Panel Regression Results – TIER 1/RWA Ratio –Normal Times

	NOMINAL GDP GROWTH			REAL GDP GROWTH			CREDIT TO GDP GAP			CREDIT GROWTH		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Lagged Dependent Variable	0.514	0.004	0.000	0.514	0.008	0.000	0.519	0.009	0.000	0.502	0.007	0.000
ROA	0.238	0.085	0.005	0.299	0.064	0.000	0.272	0.101	0.007	0.270	0.056	0.000
Logarithm of Total Assets	0.269	0.651	0.679	0.462	1.270	0.716	0.964	0.406	0.018	-0.762	0.876	0.384
NPLoans-to-Total Loans	0.414	0.032	0.000	0.426	0.032	0.000	0.419	0.031	0.000	0.472	0.036	0.000
Loans-to-Assets	-0.067	0.027	0.014	-0.090	0.018	0.000	-0.062	0.026	0.019	-0.056	0.025	0.028
Ownership	1.150	3.023	0.010	1.146	3.023	0.703	0.469	1.964	0.811	1.096	1.779	0.538
IFRS	0.429	0.608	0.480	-0,679	0.606	0.263	-1.503	0.627	0.016	3.049	0.373	0.000
Business Cycle Variable	0.174	0.007	0.000	0.127	0.011	0.000	-0.115	0.008	0.000	0.162	0.014	0.000
AR(2)	0.7275			0.6724			0.7022			0.6998		

The sample period is 2001-2015. All estimations are on the Arellano-Bover /Blundell-Bond system.

Table 2b: The Panel Regression Results – TIER 1/Total Exposure –Normal Times

	NOMINAL GDP GROWTH			REAL GDP GROWTH			CREDIT TO GDP GAP			CREDIT GROWTH		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Lagged Dependent Variable	0.827	0.008	0.000	0.806	0.011	0.000	0.819	0.012	0.000	0.819	0.012	0.000
ROA	0.111	0.048	0.020	0.072	0.063	0.250	0.159	0.033	0.000	0.087	0.039	0.026
Logarithm of Total Assets	-0.491	0.422	0.244	-0.826	0.524	0.115	-0.057	0.365	0.875	0.027	0.127	0.834
NPL	-0.010	0.006	0.097	-0.003	0.007	0.000	-0.007	0.007	0.000	0.006	0.006	0.328
Credits/Assets	0.046	0.006	0.000	0.035	0.009	0.000	0.045	0.007	0.000	0.043	0.008	0.000
Ownership	-0.295	0.132	0.025	-0.163	0.376	0.005	-0.345	0.133	0.010	-0.339	0.135	0.12
IFRS	-1.372	0.261	0.000	-1.065	0.376	0.005	-1.728	0.154	0.000	-1.260	0.251	0.000
Business Cycle Variable	0.010	0.004	0.004	-0.001	0.004	0.743	-0.013	0.003	0.000	0.006	0.007	0.389
AR(2)	0.2343			0.2443			0.2325			0.2360		

The sample period is 2001-2015. All estimations are on the Arellano-Bover /Blundell-Bond system.

Table 3a: The Panel Regression Results – TIER 1/RWA – Crisis Times

	NOMINAL GDP GROWTH			REAL GDP GROWTH			CREDIT TO GDP GAP			CREDIT GROWTH		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Lagged Dependent Variable	0.841	0.027	0.000	0.856	0.022	0.000	0.797	0.024	0.000	0.856	0.025	0.000
ROA	1.569	1.124	0.163	2.015	0.916	0.028	0.578	0.777	0.457	1.538	0.734	0.036
Logarithm of Total Assets	16.823	2.854	0.000	15.661	2.643	0.000	30.984	4.842	0.000	11.533	2.514	0.000
NPLoans-to-Total Loans	0.009	0.245	0.971	0.100	0.260	0.698	-0.762	0.298	0.010	-0.369	0.102	0.000
Loans-to-Assets	-0.710	0.113	0.000	-0.842	0.098	0.000	-0.184	0.038	0.000	-0.846	0.072	0.000
Ownership	-0.021	4.149	0.996	-0.858	4.102	0.834	-0.280	4.616	0.952	-2.806	4.148	0.499
IFRS	-88.288	16.858	0.000	-73.550	15.342	0.000	-226.181	32.613	0.000	-35.518	14.104	0.012
Business Cycle Variable	-0.226	0.133	0.090	-0.328	0.156	0.036	2.273	0.434	0.000	-0.074	0.049	0.138
AR(2)	0.3219			0.3096			0.3680			0.2214		

The sample period is 2001–2015. All estimations are on the Arellano-Bover /Blundell-Bond system.

Table 3b: The Panel Regression Results – TIER 1/Leverage Ratio – Crisis Times

	NOMINAL GDP GROWTH			REAL GDP GROWTH			CREDIT TO GDP GAP			CREDIT GROWTH		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Lagged Dependent Variable	1.055	0.028	0.000	1.057	0.029	0.000	1.094	0.027	0.000	1.045	0.032	0.000
ROA	-0.100	0.025	0.000	-0.127	0.026	0.000	-0.156	0.038	0.000	-0.149	0.025	0.000
Logarithm of Total Assets	2.856	1.607	0.076	2.094	1.635	0.200	2.484	1.882	0.187	0.838	1.497	0.576
NPL	-0.052	0.129	0.688	-0.098	0.140	0.481	-0.157	0.067	0.018	-0.187	0.139	0.181
Credits/Assets	0.052	0.015	0.001	0.047	0.016	0.003	0.045	0.019	0.022	0.029	0.018	0.103
Ownership	0.508	0.425	0.232	0.503	0.356	0.158	-0.027	0.444	0.951	0.403	0.251	0.108
IFRS	-25.847	13.171	0.050	-20.533	13.677	0.133	-23.019	14.554	0.114	-9.243	12.712	0.467
Business Cycle Variable	-0.079	0.019	0.000	-0.075	0.023	0.001	0.030	0.072	0.669	-0.023	0.009	0.018
AR(2)	0.2239			0.2239			0.4926			0.2617		

The sample period is 2001–2015. All estimations are on the Arellano-Bover /Blundell-Bond system.