The correlation between bank risk, performance, and regulatory capital for Conventional banks in golf cooperation countries

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Research Article

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Abstract

This article aims at illustrating the link between the bank risk, regulatory capital, and the bank performance. By using a panel dynamic data in the GMM estimator on a large dataset of 73 banks belonging to Golf Cooperation Countries from 2000 to 2018, we have discovered that both the regulatory capital and the bank performance have a negative association with bank risk. Thus, we have analyzed the link between the bank risk and the bank performance on regulatory capital and discovered that the bank risk negatively influences the bank performance. However, with banks with larger capital ratios the bank performance improves noticeably. Finally, we finished by demonstrating the impact of the financial crisis on these relationships, and our robustness check confirms our major findings.

1. Introduction

A great number of the studies that were conducted to examine and explain the banks profitability proved that most of them focused on production, with a common denominator being the factors that influence the effectiveness of banks, mostly on the American market.. The financial performance of European banks have been put in focus (see, for example, Bătae, 2020 ; Doumpos et al., 2016; Chen et al. 2022). More attention was divided to the profitability and the risk-taking of banks in emerging markets in the recent decades (see, for example, López-Penabad et al.2022 and Mateev et al. 2022) for recent studies of banking firms' performance. Studies on the effects of financial regulations that primarily targeted principles and procedures for determining bank risks on assets and capital adequacy requirements (see, for example, Wang et al. 2022; Mateev et al. 2022). An alternative approach is adopted by our paper that focused on performance analysis used with return to bank assets and equity with a more eclectic one-step estimation procedure based on a behavioral model of the banking firm. Bank performance is usually demonstrated in this approach as a function of internal and external determinants. The empirical works on bank performance have been drawn from both cross-national and national banking systems. Internal drivers of bank performance include typically variables like bank size, bank deposits, and equity in most researches. Size is used to determine whether or not there are economies or diseconomies of scale in the banking industry. The empirical findings offered contradictory evidence. According to Rehman, (2022), Abisola, (2022), Hannoon et al. (2021), deduced a positive and significant association between bank size and performance. Kosmidou and Holt (2022) on the other hand, showed that tiny UK banks were more profitable than larger ones over the 1998 time frame. On a panel of 431 banks in 39 countries, Carvallo and Kasman (2017) found that size had a negative and statistically significant impact on the net interest margin. The connection between bank capital and profitability was debatable. Naceur and Goaied (2001) was the first to investigate the capital–earnings link in depth. According to conventional wisdom, a greater capital ratio (CAR) was associated with a lower Return on Equity (ROE), because a higher CAR reduced the risk associated with equity and the tax benefit offered by interest deductibility. He attributed this finding to two theories. The first was that the growing capital reduces the interest rate paid on unsecured debt, and second, that the bank used extra capital to advertise that its future projects would be better., Pasiouras and Kosmidou (2007), and Ben Naceur and Goaied (2008) all demonstrated a favorable

association between bank performance and capitalization in more recent studies. Bank risk was a significant source of risk for commercial banks. While creating liquidity was a fundamental function of banks, as Cooper and Ross,(1998) demonstrated, it also carried significant risk for them. Bank risk could be a severe hazard to financial organizations, as the subprime mortgage crisis of 2007–09 demonstrated (Brunnermeier et al. (2012); Al-Farisi and Hendrawan (2011). During the financial crisis, banks with higher bank risk performed poorly in the stock market, they reduced loan creation more substantially, and charged higher interest rates on deposits (Cornett et al., 2016; Fahlenbrach et al. (2012); Ahmad et al. (2019); Yin et al., (2021). The Basel Committee on Banking Supervision implemented two new bank liquidity restrictions, the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR), in order to maintain financial stability to the banking system and to ensure that banks have enough cash to deal with future crises. However, it is debatable whether risk could inflict major damage to commercial banks during financial crises. If this is the case, bank risk would not have a large impact. Second; banks could reduce bank risk by adjusting the composition of their assets, liabilities, and off-balance-sheet things. To mitigate the negative effects of liquidity shocks, they may, for example, boost liquid assets or limit credit supply (Acharya et al., 2011; Cornett et al., 2016; Acharya and Mora, 2015). Bank risk will not have a significant impact on bank performance during financial crises if these modifications are not excessively costly. Negative influence on bank performance after bank regulatory capital may be controlled. This study investigates the following research issues in order to better understand the relationship between bank risk and bank performance during financial crises.

Proceeding by the following question: Can bank risk negatively impact bank performance during financial crises? If the answer is yes, we must look at whether the damage that bank risk causes varies depending on the characteristics of the bank. We predict the bank risk in order to have a greater negative impact on bank performance for banks with lower capital buffers. Because these banks are financially weaker, they may need to make more modifications to manage bank risk, experience more depositor withdrawals, and pay higher deposit interest rates to prevent withdrawals. As a result, they are expected to perform poorly during financial crises. We use commercial bank data from the GCC from 2000 to 2018 to answer these questions. Our sample period contains one banking crisis (the subprime crisis of 2007–09), according to Berger and Bouwman (2013)'s definitions of financial crises. We also consider the rest of years to represent normal times, as Berger and Bouwman (2013) did. This research contributes to increasing awareness about the inter-dependent relationship between bank profitability and risk-taking. Profitability is a static term; bank franchise value and charter value are dynamic opposites. Higher profitability, according to conventional wisdom, reduces bank risk-taking incentives (Paltrinieri, 2021 ; Sondakh, al., 2021); Rakshit, 2022).

We have examined how bank risk in pre-crisis periods influenced bank performance during crises, as well as whether a bank could survive a crisis by omparing the analysis of the difference in a bank's return on assets (ROA) between the crisis and pre-crisis periods. To better understand the mechanisms through which bank risk affects a bank's ROA, we have concentrated on the effects of bank risk on two key components of bank ROA: the return on assets (ROA) and the return on equity (ROE). This paper adds to the literature in a number of ways. For starters, it provides new insight into how bank risk affects banks

during financial crises. During the subprime crisis, bank risk did not only affect banks' asset and liability allocations (Acharya et al., 2011; Cornett et al., 2016; Acharya and Mora, 2015), but also increased the likelihood of bank defaults and stock price crashes (Acharya et al., 2011; Cornett et al., 2016; Acharya and Mora, 2015). (Imbierowicz and Rauch, 2014; Yin et al., 202)). In addition to previous research, our paper indicates that during the subprime crisis, bank risk contributed to worsen the survival probability and ROA. Furthermore, banks with smaller capital levels suffered deeply. According to Calomiris et al. (2015), banks with more cash had a stronger incentive to manage risk. We extend their reasoning by claiming that banks with more liquidity are better by far at risk management, and our finding that banks with more bank risk have lower capital ratios during the subprime crisis supports this argument. The paper is structured as follows. Section 1 deals with Literature survey of bank capital, performance and risk. Section 2 sets up the model and solves the baseline model. Section 3 discusses the empirical and the policy implications. Section 4 is about conclusion.

2. Literature Survey

The relationship between profitability and capital

The Capital Asset Ratio (CAR) is adversely connected with Return to Assets (ROA) and Return to Equity Capital, according to Barth, Groper, and Jahera (1998) .The negative impact is found, ceteris paribus, in a one-period model with no bank risk. If the cost of funding is impacted on capital, however, a positive link between capital and profitability is predicted, since banks with capitals lower their funding costs, resulting in higher profits. Managers have 'inside information' about future performance, according to the Signaling Hypothesis It will be cheaper for a safe bank to communicate the projected increasing performance in the future by boosting the capital than it will be for the risky banks if their remuneration packages contain stocks or stock options. Stiroh (2000) suggested that when banks raised capital to overcome high entry hurdles, they would get access to lucrative operations including issuing guarantees and subordinated notes, as well as serving as intermediators in derivative markets. In contrast to the preceding causes, Rime (2001) showed that Swiss bank earnings have a positive influence on capital via retained earnings, implying that ROE entails CAR whereas Berger et al. (2008), concluded that the link between ROC and CAR is minor for big US banks. Goddard, Casu et al. (2004); Antoun et al. (2021) have examined several European bank types and have found that there was a positive link between capital and profitability in commercial banks only because they noticed the reverse which meant a clear negative relationship in savings banks. Finally, Altunbas et al. (2007) found a link between capital and profitability for both commercial and savings banks in Europe. Abdulganiyu and Dambo (2022) proved his point when they found similar evidence for banks in OECD country.

The relationship between capital and risk

When all deposits are insured at a flat premium rate, a negative connection between capital and risk is predicted. The marginal cost of raising bank risk and/or lowering capital is zero in Pham et al (2021). this situation occurs because, in the eyes of regulators, the insurance price does not alter neither the risk nor

the capital, yet the interest sought on insured depositors' deposits remains the same as the interest demanded on a riskless asset. There is less motivation to modify any financial leverage when the insurance premium is adjusted for risk, such as considering the amount of financial leverage. According to the optimum capital buffer theory (Miki, 2016; Tabak et al., 2011), banks have an incentive to hold more capital than what is required as insurance against a violation of regulatory minimum capital requirements. This is due to banks' inability to instantly adjust capital and risk, as well as their fear of costly supervisory action or a loss of reputation among bank stakeholders. Hence, banks with relatively large capital buffers are supposed to maintain their capital buffers inspite of any risk increasing or to increase both capital \sand risk while banks with small capital buffers aim at rebuilding an appropriate capital buffer (increase capital and decrease risk). In UK banks, Paroush and Schreiber (2019) have discovered a negative link between capital and risk. They proposed a number of explanations for actual capital levels that were significantly higher than regulatory requirements (see also Berger et al., 2008). According to Akgün et al. (2021), commercial European banks have a positive relationship, whereas savings European banks have a negative relationship. Azegagh and Laasas (2021) identified a negative association between US banks Zhao et al. (2022) showed a negative relationship between commercial and cooperative Asian banks. Iman et al. (2022) recently discovered that risk-based capital ratios have no effect on bank risk. Higher risk levels explain the capital build-up of US banks throughout the 1990s, according to Alam et al. (2021) According to Kakar et al. (2021) banks that exploited the loan sales market for risk management had not only less capital but were also more lucrative and riskier than other banks. Adjibade et al. (2022); Rime (2001), on the other hand, discovered a non-negative connection between capital and risk. Furthermore Abbas and Younas (2021) claimed that capital buffers and risk have a positive connection, and that the rate of adjustment is determined by the degree of bank capital ratio (see also Berger ,2008). As a result it's worth noticing that the link between capital and profitability is as equivocal as the link between the capital and risk.

The relationship between risk and profitability

A positive link between profitability and risk can be expected in a competitive business environment where there is a prevailing symmetrical information between the bank and its borrowers. This should be the outcome of a bank demanding for a risk premium from its borrowers and stakeholders (see also Pereira and Vaz 2021; Adjibade, 2022). However, realized that risk should reduce profitability, hence there is normally a negative connection between profitability and risk (see Tanin et al., 2021; Stolz and Wedow, 2011). A positive link between profitability and risk can be expected (ex-ante) in a competitive business environment where symmetrical information between the bank and its borrowers prevails. This should be the outcome of a bank demanding for a risk premium from its borrowers and stakeholders (see also Pereira and Vaz, 2021; Abbas and Younas 2021). However, realized (ex-post) that risk should reduce profitability, hence there is normally a negative connection between profitability and risk (see Ahmad et al., 2022; Stolz and Wedow, 2011).

3. Methodology And Hypothesis Development

3.1 Model:

We will proceed by using the regression models as well as specific data for it. For our sample we will use the estimation' techniques of dynamic models in panel by applying the method of the generalized moments (GMM). Thus, the generalized Moments method (GMM) that was introduced by Holtz-Eakin, Mai (2022)., Arrelando and Bond (1991), and Arrelando and Bover (1995). This method has proved several advantages at the level of the data panel namely the control of the problems of simultaneous bias, the reverse causalities and the omission of variables. In addition to that the GMM method will allow to control both the specific and temporal effects in order to compensate for the endogenity biases of the variables especially in the presence of several delays of the dependent variable as explanatory variable. We therefore estimate the following models'equations:

$$\mathrm{Z-score_{i,t}} = \alpha_0 + \beta_1 \mathrm{CAR_{i,t}} + \beta_2 \mathrm{ROA_{i,t}} + \beta_3 \mathrm{SIZE_{it}} + \beta_5 \mathrm{DTA_{it}} + \beta_1 \mathrm{INF_{it}} + \epsilon_{\mathrm{i,t}}$$

1

$$\mathrm{CAR_{i,t}} = \alpha_0 + \beta_1 \mathrm{Z-score_{i,t}} + \beta_2 \mathrm{ROA_{i,t}} + \beta_3 \mathrm{SIZE_{it}} + \beta_4 \mathrm{DTA_{it}} + \beta_5 \mathrm{INF_{it}} + \epsilon_{\mathrm{i,t}}$$

2

$$\mathrm{ROA_{i,t}} = \alpha_0 + \beta_1 \mathrm{Z-score_{i,t}} + \beta_2 \mathrm{CAR_{i,t}} + \beta_3 \mathrm{SIZE_{it}} + \beta_4 \mathrm{DTA_{it}} + \beta_5 \mathrm{INF_{it}} + \epsilon_{\mathrm{i,t}}$$

3

Where each variable is defined below:

Bank risk :

We use the Z-score (Z) as the primary indicator of bank risk, which is defined:

$$Z_{ijt} = \frac{ROA_{ijt} + EA_{ijt}}{\sigma ROA_{ijt}}$$

where the ROA represents the return on assets, and σ(ROA) is the standard deviation of return on assets. The Z-score is traditionally interpreted as the number of standard deviations by which returns would drop to wipe out all equity of the bank (Roy, 1952), and is thus seen as the inversed probability of bank failure. A higher value indicates a higher level of stability in the bank, in other words to a lower risk of insolvency exposure.

H1 : Negative and significant regulatory bank risk effects on capital and bank performance

Regulatory capital :

For this study accrording to Tran et al.(2016) we retain two regulatory capital measures identified by the Basel Committee to measure the bank's capital. The first measure is Tier 1 capital ratio to risk-weighted assets (CAR). The second measure is total regulatory capital ratio(TRG). Setting of the minimum

capital requirements has an important influence on bank risk and bank performance. Thus, the subprime crisis consequences have strengthened the needs for regulatory capital. Consequently, it's important to know how higher capital requirements impact bank stability. According to certain hypotheses (Berger, 1995), well-capitalized banks have lower predicted bankruptcy costs and thus a lower cost of capital. When lending rates do not fluctuate greatly with bank capital, increasing bank capital ratios according to this viewpoint may have a favorable impact on bank performance.

H2 : How regulatory capital affect negatively and significantly the bank risk and the bank performance.

Bank performance: we choose two profitability measures. The first is the return on equity (ROE), the ratio of net income over the average total equity. It demonstrates financial profitability; it is then the return ,for the shareholder point of view, as it highlights the return on their investments. The second is the return on assets (ROA), the ratio of net income to the average total assets. It generally expresses the economic profitability.

H3 : The bank performance affects negatively and significantly the bank risk.

H3a : The bank performance affects positively and significantly regulatory capital.

Control variables: expressed in the vector $\mathrm{Z}_{\mathrm{i,t}}$, which represent bank-specific and macroeconomic variables.

SIZE : The logarithm of total bank assets is used to calculate bank size. If there are increasing returns to scale in banking, size may be a key factor of bank performance. However, when banks grow exessively large due to bureaucracy and other issues, it may have a detrimental influence.
H4 : Size affects bank risk and bank performance negatively

DTA : The ratio of total deposits to total assets. Due to risk and cost concerns, a high DTA is associated with greater bank lending. Higher DTA ratios should boost bank profits because loans are the riskiest and thus the highest-yielding assets. Another theory claims that increasing risk exposure reduces profitability.

H5 : The ratio of total deposit to total assets affects negatively regulatory capital and bank performance.

INF

Macroeconomic indicators .Inflation is the term we use (INF). In previous studies, there has been a link between inflation and bank profitability. High inflation rates are usually accompanied by high loan interest rates, as a result, high earnings. However, if inflation is not expected and banks are slow to change their interest rates, bank costs may rise faster than bank income, reducing bank profitability.

H6 : inflation ratio affects bank risk positively.

3.2 Data :

The data of this study comprises the annual observations of 73 conventional banks for GCC region banks such as (Saudi Arabia, Qatar, United Arab of emirates, Oman, and Bahrain) Between 2000 and 2018? the bank financial data was taken from Bankscope and Bureau van Dijk database. Macroeconomic data such as, inflation rate, were taken from World Bank. Table 1 provides definition for each variable and its corresponding data source.

Table 1
Variable definitions and data sources.

Variables	Acronym	Definition	Sources
Main variables			
Financial stability	Bank_risk	the Z-score	Bankscope and author's calculation
Regulatory capital	CAR	Tier-1 capital ratio divided by total risk-weighted assets	Bankscope and author's calculation
	TRG	Total regulatory capital ratio	Bankscope and author's calculation
Performance	ROE	Return on equity	Bankscope and author's calculation
	ROA	Return on assets	Bankscope and author's calculation
Control variables			
Bank size	SIZE	Logarithm of total assets	Bankscope and author's calculation
Bank deposits	DTA	The ratio of total deposits over total assets	Bankscope and author's calculation
Inflation	INF	Annual inflation rate	World bank and an author's calculation

Table 2
Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
BANK_RISK	748	0.832	0.227	0.0004	2.136
ROA	748	2.488	6.307	-55.487	80.5
ROE	748	8.932	25.769	-519.149	95.593
CAR	748	22.617	18.893	-10	223.12
TRG	748	26.661	20.571	-13.1	223.12
SIZE	748	3.466	0.923	1.055	6.210
DTA	748	0.603	0.477	0.0004	16.717
INF	748	2.944	2.888	-4.9	15.1

4. Estimated Results

4.1 The interaction relates bank risk, regulatory capital, and bank profitability

Table 3
Estimation of bank risk, regulatory capital and bank performance

	(1)	(2)	(3)
	BANK_RISK	**CAR**	**ROA**
L.BANK_RISK	0.160***		
	(16.43)		
L.CAR		0.573***	
		(39.33)	
L.ROA			0.364***
			(528.91)
BANK_RISK		-20.23***	-17.10***
		(-20.83)	(-152.45)
ROA	-0.00899***	0.138***	
	(-100.76)	(15.38)	
CAR	-0.00913***		0.113***
	(-53.57)		(-57.79)
SIZE	-0.0893***	0.450	-0.119*
	(-15.11)	(0.92)	(-1.82)
DTA	-0.606***	-42.86***	-22.83***
	(-30.66)	(-21.75)	(-130.93)
INF	0.00288***	-0.165***	-0.0159***
	(13.52)	(-17.94)	(-4.76)
AB test AR(2)	0.0364	0.1139	0.1736
Sargan test	1.0000	1.0000	1.0000
Wald test	0.0000	0.0000	0.0000
Nbr of groupe	69	69	69
_cons	1.667***	54.38***	34.17***
	(42.86)	(24.87)	(119.06)
N	784	784	784

	(1)	(2)	(3)
*Note :BANK_RISK, ROA, CAR, SIZE, DTA INF represent financial stability mesasured by zscore, bank performance measured by net income to total assets, regulatory capital measured by tier 1 capital, ratio of total deposit to total assets, inflation rate. AB arellano-bond test of residue autocorrelation. Sargan: test of the validity of the instruments. N: number of observations. T-values in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.*			

We first deal with the results of the estimated equation of the association between bank risk and regulatory capital and bank performance. Overall, columns 1 shows that the two variables have a negative and significant impact on bank risk which is consistent with our first hypothesis. Our result is consistent with the conclusion of Hassan et al .2018, which suggested that banks are more quiet to maintain its stability as they are exposed to reputational risk which can deteriorate the trust of investors, depositors and eventually can lead to bank run and insolvency. Also, for DTA it maintained a negative impact for bank risk because according to Berger and Bouwman (2009) when the bank offer credit to an investor it transforms the liquid asset into the liquid liability and consequently can not face the massive withdrawals for depositors.

The impact of bank stability and bank performance on regulatory capital are presented in columns 2. Bank stability affects negatively regulatory capital which is consistent with our hypothesis, a rise in capital ratio is directly linked with a reduction in the bank risk because the regulatory capital plays the role of a capital buffer during crisis (Berger 2009). Moreover, bank performance measured by ROA impacts positively regulatory capital which is in line with Tran (2016) banks with higher capital ratio that maintain better performance.

Columns 3 presents the impact of bank stability and regulatory capital on bank performance. Bank risk affects negatively bank performance which confirms the result of Hassan et al.(2019) banks with limited investment chance, have generally excess of liquidity which ultimately reduces their profitability and affects negatively their stability. Hence, regulatory capital affects bank performance positively and significantly, high performance is associated with more capitalized banks.

4.2 Robustness check

To give more robustness to our results we perform the following robustness tests, we replace:

- The tier 1 capital by the total regulatory capital.
- The measure of profitability "ROA" by "ROE"

Table 4
Estimation of bank performance with ROE

	(1)	(2)	(3)
	BANK_RISK	CAR	ROE
L.BANK_RISK	0.283***		
	(27.33)		
L.CAR		0.574***	
		(40.56)	
L.ROE			-0.328***
			(-43.94)
BANK_RISK		-20.68***	-120.6***
		(-33.03)	(-84.39)
ROE	-0.000796***	0.00678***	
	(-50.01)	(6.33)	
CAR	-0.00856***		0.710***
	(-37.98)		(5.34)
SIZE	-0.0696***	0.214	37.52***
	(-8.42)	(0.68)	(49.06)
DTA	-0.658***	-41.77***	-164.5***
	(-32.00)	(-39.27)	(-65.98)
INF	0.00344***	-0.167***	1.376***
	(14.93)	(-14.66)	(20.00)
AB test AR(2)	0.0950	0.1348	0.0165
Sargan test	1.0000	1.0000	1.0000
Wald test	0.0000	0.0000	0.0000
Nbr of groupe	69	69	69
_cons	1.507***	55.09***	64.13***
	(41.39)	(45.28)	(12.05)
N	784	784	784

	(1)	(2)	(3)
Note :			
*BANK_RISK, ROE, CAR, SIZE, DTA INF represent financial stability mesasured by zscore, bank performance measured by total equity to total assets, regulatory capital measured by tier 1 capital, ratio of total deposit to total assets, inflation rate. AB arellano-bond test of residue autocorrelation. Sargan: test of the validity of the instruments. N: number of observations. T-values in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.*			

Table 4 represents the estimation of equations replacing the performance measure ("ROE") with the second measure (ROA). The relationship between bank risk and regulatory capital (columns 1 and 2) is consistent with the results already obtained and verifies hypothesis H1 and H2: a negative and significant relationship between the two variables. For columns 3 the negative effect of bank risk on profitability is consistent with the previous results. Similarly, the impact of regulatory capital is always positive and significant with profitability.

Table 5
Estimation of regulatory capital with TRG

	(1)	(2)	(3)
	BANK_RISK	TRG	ROA
L.BANK_RISK	0.239***		
	(26.50)		
L.TRG		0.426***	
		(63.09)	
L.ROA			0.244***
			(317.02)
BANK_RISK		-18.10***	-12.73***
		(-33.70)	(-107.33)
ROA	-0.00798***	0.0948***	
	(-32.77)	(14.82)	
TRG	-0.00764***		-0.0128***
	(-41.92)		(-9.57)
SIZE	-0.0706***	0.369*	0.286***
	(-8.04)	(1.83)	(4.17)
DTA	-0.610***	-50.85***	-12.15***
	(-48.19)	(-58.32)	(-90.82)
INF	0.00392***	-0.194***	0.0565***
	(10.84)	(-20.23)	(19.35)
AB test AR(2)	0.0743	0.3740	0.1544
Sargan test	1.0000	1.0000	1.0000
Wald test	0.0000	0.0000	0.0000
Nbr of groupe	69	69	69
_cons	1.514***	63.47***	19.33***
	(41.73)	(50.37)	(87.13)
N	784	784	784

	(1)	(2)	(3)
Note :			
*BANK_RISK, ROE, CAR, SIZE, DTA INF represent financial stability mesasured by zscore, bank performance measured by total equity to total assets, regulatory capital measured total regulatory capital, ratio of total deposit to total assets, inflation rate. AB arellano-bond test of residue autocorrelation. Sargan: test of the validity of the instruments. N: number of observations. T-values in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.*			

Table 5 represents the estimation of equations by replacing the CAR regulatory capital measure by TRG. The same results found in the first estimation (in Table 4) are maintained: verification of H1 and H2.

Another interesting question concerns the link between financial stability, regulatory capital and banking performance in times of crisis. The 2007–2009 financial crisis led to the bankruptcy of a large number of banks, forced re_capitalisations, troubled mergers with healthier banks and significant government intervention around the world. In this context, it is particularly interesting to examine whether this abnormal situation has led to a reassessment of the role of regulatory capital. In addition to that, Regulatory capital could allow banks to better withstand shocks in the sector of their business. This suggests that banks with high capital ratios have an incentive to improve their performance during crises and to take advantage of market shares.

The model (1) in Table 6 shows that, in times of crisis, banks are with higher capital ratios than in normal times, as indicated by the negative and statistically significant coefficient on bank risk. that is, the banks that are going to strengthen capital ratios in times of crisis. Evidence points to the positive side of regulation, which can encourage banks to take less risk in turbulent times, as DeYoung and Torna (2013) have recently documented.

Table 6
Estimation of bank risk, regulatory capital and bank performance on crisis and non crisis periods.

Panel A	**Crisis period**		
	(1)	(2)	(3)
	bank_risk	car	roa
L.bank_risk	0.108		
	(1.62)		
L.car		0.156***	
		(4.55)	
L.roa			0.712***
			(16.37)
bank_risk		-13.72***	-2.425
		(-5.73)	(-1.35)
roa	-0.00450***	0.277***	
	(-5.05)	(7.68)	
car	-0.0122***		0.418***
	(-4.78)		(5.97)
size	-0.170***	0.209	4.803**
	(-3.71)	(0.14)	(2.35)
dta	-1.142***	-78.05***	-5.366
	(-5.30)	(-7.03)	(-0.73)
inf	0.00195**	-0.0915**	0.0234
	(2.11)	(-2.12)	(0.90)
_cons	2.446***	83.10***	-20.89***
	(12.94)	(7.49)	(-2.75)
N	98	98	98
Panel B	**Non Crisis period**		
	(1)	(2)	(3)
	bank_risk	**car**	**roa**
L.bank_risk	0.161***		

Panel A	Crisis period		
	(9.20)		
L.car		0.632***	
		(34.60)	
L.roa			0.282***
			(468.46)
bank_risk		-22.83***	-14.25***
		(-40.47)	(-88.69)
roa	-0.00652***	0.0526***	
	(-22.72)	(4.46)	
car	-0.00914***		-0.104***
	(-34.54)		(-45.86)
size	-0.0907***	-0.507	-1.321***
	(-9.69)	(-1.31)	(-17.19)
dta	-0.503***	-39.23***	-17.31***
	(-42.27)	(-51.61)	(-110.89)
inf	0.00243***	-0.164***	-0.00391
	(6.79)	(-5.40)	(-0.80)
_cons	1.594***	56.44***	32.67***
	(32.97)	(29.82)	(109.99)
N	686	686	686

Note :

*BANK_RISK, ROE, CAR, SIZE, DTA INF represent financial stability mesasured by zscore, bank performance measured by total equity to total assets, regulatory capital measured total regulatory capital, ratio of total deposit to total assets, inflation rate. AB arellano-bond test of residue autocorrelation. Sargan: test of the validity of the instruments. N: number of observations. T-values in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.*

Conclusion

We investigated the relationship between bank financial stability, regulatory capital, and performance for banks in the GCC zone from 2000 to 2018, and we evaluated the effectiveness of macroprudential regulations in mitigating any possible negative associations. We have addressed a number of critical

issues based on the disaggregated components of capital inflows. The first is to investigate how regulatory capital ratios impact financial stability at the bank level before and after the crisis. The second specifies the sort of performance on financial stability. The final question is whether macroprudential regulations are successful in minimizing the negative consequences of capital ratios on bank financial stability.

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