Bank Capital Adequacy: The Impact Of Fundamental And Regulatory Factors In A Developing Country

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ABSTRACT

This paper provides evidence that the overcapitalized banks are much more sensitive to fundamental factors rather than to the regulatory requirements such the Basle's Accord requirements, which raises the question of whether Basel's limits are sufficient to minimize financial crises. Also, keeping buffers against falling below the minimum requirements appear to be of second order importance. Three fundamental factors affect capital adequacy in Jordan; risk, return and activity. Risk indicators drive the capital adequacy ratios downward. Return on average assets (ROAA) has the biggest impact among all factors, banks fuel their capital internally following the pecking order theory, and they also raise capital whenever their activities (loan to asset ratio) improve. Return on average equity (ROAE) is a cost factor; banks avoid issuing capital whenever cost of common equity is high. This paper also provides evidence that systematically important banks hold less capital, a sign of moral hazard.

JEL Classification: C2; G11; G25

Keywords: Capital Adequacy; Basel Accord; Systematically Important Banks; Bank Regulators; Moral Hazard

1. INTRODUCTION

Capital adequacy is one of the important factors that affect bank safety. It is governed by the Basel accords for member countries of the Basel committee. Banks should maintain at least 8 percent of their risk-weighted assets (RWA) in the form of total capital and a minimum level of core capital equals to 4 percent of (RWA). The theory of capital adequacy is derived from two schools of thoughts, the first implies that the optimal level of capital is a decision made internally by individual banks; regulators should not interfere in determining the capital adequacy ratios given that banks are well suited to know their specifics much more than regulators. The second school is not completely against the first, it admits that capital level is a specific factor, but requires a minimum safety level for each ratio and allows complete freedom beyond that.

Capital is often described as a cushion against possible losses, the bigger is the cushion, the more is the bank's ability to absorb future losses. However, the smaller is the cushion, the lower is the ability of the bank to face future losses and deposits will be much more vulnerable. Deposit exposure will be higher with lower levels of capital and the bigger is the exposure, the bigger is the probability of bankruptcy. Banks are risk-averse rational wealth maximizers, while regulators are conservative organizations that target the safety and soundness of the banks and the protection of depositors. The consequences of bank failures are severe on depositors and the rest of the stakeholders and on the macroeconomics environment. Bank failure can be contagious by triggering more failures that can lead to a chaos because banks are closely connected. Systematic failures may lead to negative macroeconomic outcomes in addition to the associated social cost.

The rational for holding minimum levels of capital is not obvious. Many banks tend to hold the minimum regulatory levels to minimize their cost of capital. Moreover, since managers are held accountable for their financial performance, they prefer higher levels of leverage at the expense of capital adequacy. Managers believe that more leverage improves the financial performance and will be less subject to the market disciplining. Holding lower levels of capital adequacy ratios can be the result of the extra protection that banks enjoy from their regulators, another moral hazard motive.

Many banks are overcapitalized as they believe that more capital boosts their safety and lowers their costs of raising funds from all sources. Jordanian banks are overcapitalized, which raises the question of whether banks are driven by regulatory requirements or by fundamental factors? This is the focus of this paper. Moreover, it is claimed that large banks, or the so-called systematically important banks (SIBs) (whose failures might trigger financial crises), are 'too-big-to-fail', implying a moral hazard issue which raises the second question of this paper of whether there is a moral hazard behavior in Jordanian large banks.

This study investigates the factors influencing the adequacy of capital ratios in Jordan using a panel data analysis. The sample consists of 13 chartered national commercial banks for the period 2007-2016. Islamic banks and foreign banks are excluded due differences in structures and functions. Annual data is taken from bank financial statements documented in the Amman Stock Exchange (ASE). The rest of this paper is organized as follows: section 2 summarizes the related literature. Sections 3 and 4 present the methodology and results, respectively and the final section concludes.

2. LITERATURE REVIEW

The theory of capital adequacy is derived from the broader and well-known theory of capital structure. Both theories search for determinants of optimal capital structure. In banking, capital structure is a special subject especially for regulators. It is on the top of their agendas at all times because of sensitivity related to depositors' money. Banks are inherently risky due to their high leverage levels that is funded by depositors. Even though central banks know this weakness in the structure of banks, yet they license them to accept unconditional deposits.

Capital structure has been under deep investigation for over 70 years, it has been tackled from different angles; many researchers looked at its effect on the value of the frim (Hatfield, Cheng & Davidson, 1994; Miller, 1977; Miller, 1995; Modigliani & Miller, 1958; Modigliani & Miller, 1963). Others looked at its influence on performance (Goyal, 2013; Vatavu, 2015). In recent years, the issue of adequate capital has been under deep invstigation. This paper is looking at the factors influencing bank capital adequacy similar to Olarewaju and Akande (2016), Aktas, Acikalin, Bakin & Celik (2015), Hafez and El-Ansary (2015) and Bateni, Vakilifard & Asghari (2014).

Capital structure theory was first pioneered by Modigliani and Miller (M&M). In (1958), under the restrictive assumption of perfect markets, they show that firm value is independent of its mix of capital, implying that regulators should not get involved in setting the levels of adequate capital. In 1963, however, they revisited the issue but included corporate income tax and reached an interesting conclusion. In their correction paper, they argue that more leverage increases firm's value, no corner solution. This implies that banks should continue to accept cheap and tax-deductible deposits regardless of their levels of equity capital. In 1977, Miller incorporates personal income taxes in addition to the corporate income tax, and show that a corner solution can be reached. Miller (1995) argues that although there are important differences in bank financing compared to the financing of nonfinancial firms, "M&M propositions still hold in the banking industry".

Hatfield et al. (1994) examine whether firms that are deviating from their optimum level of debt, defined as the industry average, affect their own values. The ratio of long-term borrowing to net worth, is estimated based on debt book value and market value to equity. Their sample consists of 183 firms and for the period 1982 to 1986. Firms with debt ratios that are higher than the industry average are classified as high-debt firms and vice versa. Using the single index market model (SIMM) and the event-study methodology, they contend that the market reaction to the increased leverage of both high-debt firms and low- debt firms is similar. Stock prices reacted negatively every time a firm issues debt, regardless of whether its debt level is above or below the industry average.

Frank and Goyal (2003), following Myers and Majluf (1984), test whether firms follow a pecking order in selecting their sources of financing. That is, lower-cost source of financing is selected first and higher-cost of financing source is selected based on its order. More specifically, firms first use their internal capital and whenever they use external financing, they prefer debt. They test whether the pecking order theory holds by using data from 1971-1998 on a large number of publicly traded American firms. Results show that it does not hold, external financing is used more especially through issuing stocks more than bonds. Vatavu (2015) show that performance, measured by return on assets and return on equity, improves cross-sectionally as more equity financing is used.

Bank capital structure has not received the same attention historically as that of nonfinancial firms until recently. Therefore, the following analysis focuses on bank capital adequacy. Goyal (2013) tests the effect of capital mix on performance of 19 Indian publicly traded banks during the period 2008-2012 using the linear regression. Their results show that the ratio of short-term debt to capital positively affect performance. On the contrary, the ratios of long-term debt and total debt to capital appear to have negative impact on profitability. Firm size (measured by total assets in logarithm) positively affect (ROA) and (EPS) and negatively affect ROE, while asset growth has a positive effect on all three measures. Both size and growth are control variables.

Hafez and El-Ansary (2015) report a positive effect from liquidity (loans to deposit ratio) and management quality (earning assets to total assets ratio) and a negative effect from size (Ln assets) and risk (loan loss provisions to total loans ratio) on the capital adequacy ratios of Egyptian commercial banks. Bateni et al. (2014) report a negative impact from size and a positive one from loan to asset ratio and profitability (both ROA and ROE) on capital adequacy ratio of Iranian private banks.

Olarewaju and Akande (2016) show a significant positive effect from ROA and bank size (Ln assets) and a significant negative effect from ROE, credit risk (nonperforming loans to total loans), total deposits to total assets, liquidity (total loans to total deposits) on the ratio of capital. Similarly, Aktas et al. (2015) claim that a positive effect on capital adequacy ratio is driven by ROA, liquidity, net interest margin, stock market volatility and deposit insurance. While a negative impact is driven by size, leverage, risk, economic growth rate and governance. Their study was conducted on European banks for the period 2007-2012.

Klepczarek (2015) takes a slightly different approach by investigating the determinants of Tier 1 ratio (core capital) of a randomly selected group of European banks. The findings reveal a negative effect of size, total risk (risk-weight assets to total assets) and deposits to liabilities. Sha'ban et al. (2016) study the factors affecting capital structure of 149 banks operating in the European Economic Area for the period 2005-2014. They report that equity ratio is negatively associated with size and positively with performance, market risk, market-to-book ratio, and dividends. Nonperforming loans ratio is not statistically significantly. They confirm the moral hazard behavior of 'large systematically important banks' of holding significantly lower ratio of capital.

Gropp and Heider (2010) provide evidence that the similarities in capital structure between banks and nonfinancial firms are greater than what the literature previously reported. Specifically, they show that the factors affecting firms' capital structures are similar to those affecting large, publicly traded banks in the US and Europe. They also claim that banks hold much higher levels of capital than required not because they want to keep buffers to "insure against falling below the minimum capital requirement". The authors suggest that profitable banks are driven by the lower cost of raising equity not by the buffer drive for future downturns. Moreover, "banks appear to have stable capital structures at levels that are specific to each individual bank and time invariant. Both of these findings for banks mirror those found for non-financial firms". The authors also offer evidence that defeat the notion that "banks increase their leverage in order to maximize the subsidy arising from incorrectly priced deposit insurance". They conclude that "capital regulation and buffers may only be of second order importance in determining the capital structure of most banks."

Olarewaju and Akande (2016) and Okuyan (2013) report a negative impact from risk on the ratio of capital. Allen Fulghieri & Mehran (2011) argue that banks hold higher levels of capital to enhance the monitoring function of shareholders through the market discipline mechanism. Similarly, Miles, Yang and Marcheggiano (2013) and Admati DeMarzo, Hellwig and Pfleiderer (2013) argue that banks hold more capital to reduce their risk profile and stockholders' required return in order to minimize the cost of raising new equity capital. This of course reduces the risk of systematic banking crisis. In fact, Admati et al. (2013) disagree with the argument that more equity capital is costly, on the contrary, they believe that highly leveraged banks suffer more than highly capitalized banks. Lindquist (2004) using panel data from Norway, tests the buffer hypothesis, which states that banks hold more capital to insure against falling below the capital requirements in the future. He argues that the reason that banks hold higher levels of capital than the required minimum is to avoid the "high cost associated with issuing stocks at a short notice in case of any violation of capital requirements".

2.1 Hypotheses Testing

The following are the hypotheses:

H_{01}: Jordanian banks are more sensitive to the regulatory capital requirements than to fundamental factors.

H_{02}: Systematically important banks are not too-big-to-fail, size positively affects capital adequacy ratio.

H_{03}: Jordanian banks do not follow a pecking order mechanism when raising funds.

3. METHODOLOGY

3.1 Sample Used

This paper estimates a balanced data linear regression using a fixed effect model of 13 Jordanian commercial banks over the period 2007-2016 comprising 130 observations. The annual data is collected from financial statements submitted to the Amman Stock Exchange (ASE). The number of banks in Jordan is currently 25, of which 13 are national commercial. The criteria for the selected banks is based on the type of functions they perform. All of them are commercial, conventional and each has a license as a national Jordanian bank. The other banks are either foreign or Islamic.

3.2 Model Development

A summary of the variables and their measurements can be found in Table 1.

3.2.1 The Dependent Variable

Capital adequacy is measured in two ways, the first is the total ratio and the second is the primary capital adequacy ratio based on Basel standards. Total capital for this matter is the sum of primary (core) and supplementary capital. Basel Accords make this distinction to emphasize the importance of the core as a representative of pure equity capital, which includes instruments with no fixed maturities such as common shares, retained earnings and other reserves. While supplementary is not pure capital, it includes subordinated debt and general loan-loss reserves. Among other reasons, pure capital is the factor that has the biggest influence on market discipline needed for monitoring bank management behavior. Clearly, the higher the capital, the better is the surveillance and monitoring of owners over management behavior. For this study, tier 1 capital is used as the dependent variable as an added contribution to the literature because it has the biggest influence on market discipline. For robustness, the model is also estimated using the Total capital adequacy ratio.

3.2.2 The Independent Variables

Two groups of variables are considered in this paper, internal and external. The internal variables are taken from financial statements and the external are macroeconomic variables.

3.2.3 Risk and Credit Risk

When risk increases, capital adequacy ratios (CAR) decline and banks should raise their capital to maintain the stability of capital adequacy ratios. However, if banks are overcapitalized, then their behavior will not be predictable. They might let the ratio decline as long as they comply with the minimum required level in order to avoid raising costly equity capital at times of rising risks. Naturally, if a bank has an optimal level of capital, it should raise its capital level whenever risk goes up, an implication of the theory of finance. Managers on the other hand, prefer debt to equity based on cost justifications. Deposits are much cheaper than equity, but their risks are much higher, moral hazard implies less capital. The sign is not predictable, both signs can be justified. When uncertainty is high, the cost of capital (deposits and equity) goes up and banks avoid issuing equity, which negatively affect the capital adequacy

ratio. Rational behavior however requires an increase in capital to meet the increased risk level. Therefore, both signs are possible. This paper expects a negative sign.

3.2.4 Bank Size

Bank size is expected to have a negative impact on diversification and moral hazard grounds. Systematically important banks (SIBs) justify their holdings of lower equity capital by claiming that their assets portfolios are better diversified and that their risk is therefore less than smaller banks. This paper expects that the moral hazard too-big-to-fail behavior to be present in Jordan such that (SIBs) maintain lower levels of capital because regulators cannot afford to let them fail. I base my prediction of the direction on this moral hazard phenomenon, which implies a negative sign.

3.2.5 Performance

One of the sources of capital is profit. Return on assets is therefore expected to positively affect capital adequacy. However, return on equity, although another measure of performance, it also represents the cost of raising new equity. The higher is the cost, the lower is the capital adequacy ratio.

3.2.6 Leverage

More leverage reduces the capital ratios unless banks respond by raising their equity whenever risk is heightened. Moral hazard is also present here because bankers prefer debt. They know that they are implicitly protected by regulators and explicitly through the deposit insurance schemes. The direction of the deposit to assets ratio is expected to be negative.

3.2.7 Liquidity

The loan to deposit ratio is an activity measure and liquidity indicator. Therefore, whenever this ratio is higher (liquidity is lower), the capital adequacy ratio is expected to be lower. An inverse relationship is anticipated.

3.2.8 Loans to Assets Ratio

This ratio is expected to have a negative effect due to the requirements of the Basel standard, as loans appear in the denominator of (CAR).

3.2.9 Gross Domestic Product

As far as economic activity, GDP is intuitively a driving factor of bank activity represented by increased levels of deposits and loans which requires increased capital. As real growth rate goes up, banks stand ready to finance and accept the increased deposits. However, even if banks raise their capital, the ratio my take any direction, therefore any sign is possible.

3.2.10 Inflation Rate

Inflation rate is a risk factor that requires a capital buffer. The direct effect is expected to be negative. A lower (CAR) is therefore possible with increasing inflation rate.

3.3 Model Specification

3.3.1 Pooled Regression Model

This model is the most restrictive panel data model which sets constant coefficients, as it is normally assumed in the cross-sectional estimation.

$$Y_{it} = \beta_1 + \beta_2 X_{it} = \alpha + \varepsilon_{it} \quad (1)$$

Where X_{it} is a vector of independent variables (as described below), the intercept α, is independent of i and t, and the error term, ε_{it}, varies over i and t.

However, due to the unobserved heterogeneity across sections, the fixed and random effect models can be used. The fixed effect model is applied whenever bank-specific effects are correlated with the independent variables, otherwise the random effects model is appropriate.

3.3.2 Fixed Effect Model

Bank-specific effects are permitted to be correlated with the independent variables captured by X, where X is a vector of time-variant independent variables.

$$Y_{it} = \beta_1 + \beta_2 X_{it} = \alpha_i + \varepsilon_{it} \quad (2)$$

In this case, each bank has its own intercept term, but they all have the same slope parameters. The main benefit of the fixed effect model is that it captures all bank characteristics that are difficult to measure and that are time-invariant. This is done by introducing α_i in the model. The fixed effect model can be estimated in many ways, one way is the within-group fixed effects which starts by calculating the means of all variables (demeans), then subtracting the demeans from the observed values:

$$\bar{Y}_i = \beta_1 + \beta_2 \bar{X}_i + \alpha_i + \bar{\varepsilon}_i \quad (3)$$

$$(Y_{it} - \bar{Y}_i) = (\beta_1 - \beta_1) + \beta_2 (X_{it} - \bar{X}_i) + (\alpha_i - \alpha_i) + (\varepsilon_{it} - \bar{\varepsilon}_i) \quad (4)$$

$$Y_{it} - \bar{Y}_i = \beta_2 (X_{it} - \bar{X}_i) + (\varepsilon_{it} - \bar{\varepsilon}_{it}) \quad (5)$$

Where $\overline{Y}_i$ is the mean value of the dependent variable for bank i, $\overline{X}_i$ is the mean values of the regressors for bank i and the mean value of α_i is α_i since it is time-invariant. By eliminating the fixed effect terms, the parameters can be estimated by using OLS estimation of the time-demeaned dependent variable on the time-demeaned explanatory variables.

3.3.3 Random Effect Model

In this model, each bank has the same slope but different α, and α_i is combined with the error term to form a composite error term, it is time-invariant and homoscedastic across banks. The bank-specific effects are independent of the regressors:

$$Y_{it} = \beta_1 + \beta_2 X_{IT} + (\alpha_I + \varepsilon_{IT}) \quad (6)$$

More specifically, two multiple regression models are estimated in pooled regression, fixed and random effects forms:

Model 1

$$CAR_{1IT} = \beta_0 + \beta_1 CR_{it} + \beta_2 Risk_{it} + \beta_3 Size_{it} + \beta_4 ROAA_{it} + \beta_5 ROAE_{it} + \beta_6 DepAr_{it} + \beta_7 LoanDep_{it} + \beta_8 LAR_{it} + \beta_9 RGDPGR_{it} + \beta_{10} IR_{it} + \mu_{it} \quad (7)$$

Model 2

$$CAR_{IT} = \beta_0 + \beta_1 CR_{it} + \beta_2 Risk_{it} + \beta_3 Size_{it} + \beta_4 ROAA_{it} + \beta_5 ROAE_{it} + \beta_6 DepAr_{it} + \beta_7 LoanDep_{it} + \beta_8 LAR_{it} + \beta_9 RGDPGR_{it} + \beta_{10} IR_{it} + \mu_{it} \quad (8)$$

Where:

β_0	=	the intercept
β_i	=	the coefficients
CAR_1	=	Primary ratio
CAR	=	Total ratio
CR	=	Impaired loans provision to total credit facilities ratio
RISK	=	Risk-weighted assets to total assets
SIZE	=	natural logarithm of total assets
ROAA	=	Return on average assets
ROAE	=	Return on average equity
DepAr	=	Deposits to assets ratio
LoanDep	=	Loans to deposits ratio
LAR	=	Loans to assets ratio
RGDPGR	=	Real GDP growth rate
IR	=	Inflation rate
μ	=	Error term
it	=	i is the individual factor and t is the time factor

3.4 Models Statistics

Table 1 presents the variable definition, sign, and measurement.

Table 1. Definitions of Variables

Variable	Measure
Dependent variable	
1.Primary ratio (CAR_1)	Tier 1 capital / Average Assets
2.Total ratio (CAR)	Total capital / Average Assets
Independent Variables	
1.Credit Risk (CR) (-)	Impaired Loans Provisions/Total credit facilities
2.Risk (-)	Risk-Weighted Assets/Total Assets
3.Size (-)	Natural Logarithm of Assets
4.Return on Average Assets (ROAA) (+)	Earnings after Tax/Average Assets
5.Return on Average Equity (ROAE) (-)	Earnings after Tax/Average Equity
6.Leverage Risk (DepAr) (-)	Deposit/Assets
7.Liquidity (LoanDep) (-)	Loans/Deposits
8.Activity (LAR) (-)	Total Loans / Total Assets
9.Economic Activity (RGDPGR) (+)	Real GDP Growth Rate at Market Prices
10. Inflation rate (IR) (-)	Percentage Change of Consumer Price Index

3.4.1 Descriptive Statistics

The total ratio (CAR) is much higher than the required level by the Central Bank of Jordan (CBJ). It averaged 18 percent during 2007-2016 compared to a required level by the (CBJ) of 12 percent and an international standard requirement of 8 percent. Additionally, the average Tier 1 ratio, 18 percent, is much higher than the required level by CBJ of 6 percent and by Basel II standard of 4 percent. The system is overcapitalized and the CBJ ratios are therefore not binding. This explains to a large extent the lower levels of ROAA and ROAE that prevailed during the study period. Return on equity lies usually between 10 percent to 20 percent internationally. The average in Jordan is on the lower side of the limit as presented in Table 2 which is acceptable given the political instability surrounding Jordan. Jordanian commercial banks are conservative in terms of their risk-taking behavior when judged against the minimum required levels of capital.

Table 2. Descriptive Statistics

	CAR1	CAR	CR	Risk	Size	ROAA	ROAE	Depar	LoanDep	LAR
Max	.36	.37	.05	.96	10.16	.025	.200	.79	1.21	.47
Min	.11	.11	0	.37	5.40	.001	.003	.49	.47	.31
Mean	.18	.18	.02	.68	7.51	.013	.096	.65	.73	.47
STD	.05	.05	.01	.11	1.02	.005	.040	.07	.14	.07

3.4.2 Correlation Matrix

Table 3 reports the correlation coefficients and shows that the coefficients are generally acceptable and within normal levels except for the correlation between ROAA and ROAE and between RISK and loan to assets ratio (LAR). The highest correlations with the dependent variables CAR and CAR1 are coming from credit risk, RISK and SIZE.

Table 3. Correlation Coefficient Matrix

	CAR	*CAR1*	*CR*	*RISK*	*SIZE*	*ROAA*	*ROAE*	*DepAR*	*LoanDep*	*LAR*
CAR	1									
CAR1	0.90	1								
CR	-0.47	-0.50	1							
RISK	-0.48	-0.52	0.50	1						
SIZE	-0.36	-0.05	0.03	-0.10	1					
ROAA	0.11	0.07	-0.23	-0.09	0.08	1				
ROAE	-0.13	-0.20	-0.19	-0.18	0.08	0.88	1			
DepAR	-0.31	-0.35	0.33	0.02	0.16	0.00	0.16	1		
LoanDep	-0.01	-0.04	0.07	0.45	-0.26	0.02	-0.08	-0.61	1	
LAR	-0.29	-0.35	0.37	0.64	-0.19	0.04	0.03	-0.01	0.79	1

3.4.3 Coefficient Diagnostics

To determine which model of the pooled regression and fixed and effect is most reliable, Wald-test is used while Hausman-test is used to decide between the fixed effect and the random effect models. Results of Wald-test are shown below:

Table 4. Wald-Test

Test Statistic	Value	p-value
Model 1 (CAR1):		
F-statistic	7.8	0.0000
Chi-square	93.4	0.0000
Model 2 (CAR):		
F-statistic	5.9	0.0000
Chi-square	70.4	0.0000

The model includes 13 banks; therefore, the fixed effect includes 12 dummy variables. The Null and alternative hypotheses are:

H_0: All dummy variables are equal to zero, the pooled effect is most appropriate

H_A: Fixed effect is appropriate

Given that the probability values of F-statistic and Chi-square in both models (CAR1, CAR) are all very small, less than 5 percent in Wald-test, the null hypotheses are rejected; therefore, the fixed effect models are the most appropriate.

Similarly, Hausman Chi-square P-values are less than 5 percent in both models, the null hypotheses are rejected, and the fixed effect is most appropriate for both models.

H_0: The random effect is most appropriate

H_A: Fixed effect is most appropriate

Table 5. Hausman-Test Chi Square

Test Statistic	Value	P-Value
Model 1 (CAR1)	27.1	0.0025
Model 2 (CAR)	32.5	0.0003

4. RESULTS

For robustness, two regression models are estimated Models 1 and 2 and their results are presented below in tables 4 and 5 using the same CAR1 and CAR, respectively, as dependent variables.

4.1 Model 1 (CAR1)

According to Basel standard, there are two kinds of capital. Primary capital, which is classified as core (Tier 1) and supplementary (Tier 2) capital. In this study, total capital or regulatory capital is measured as the sum of Tier 1 and Tier 2. Regulators focus on capital for safety purposes because it is the last resort against solvency risk.

The results of the fixed effect model show that all internal variables are significant at the 5 percent level. They are jointly significant at 1 percent and the model explains 89 percent of the variation of the dependent variable based on adjusted R^2. External factors are not significant.

Table 6. Panel Regression Results of Model 1 (CAR1)

Variable	Pooled Regression		Fixed Effect OLS		Random Effect	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
A. Internal						
CR	-1.030	0.000	-1.34	0.000	-1.07	0.000
Risk	-0.309	0.000	-0.254	0.000	-0.245	0.000
Size	-0.002	0.307	-0.049	0.000	-0.008	0.051
ROAA	12.968	0.000	9.675	0.000	11.169	0.000
ROAE	-1.936	0.000	-1.468	0.000	-1.702	0.207
DepAr	0.079	0.522	-0.400	0.033	-0.212	0.156
LoanDep	0.066	0.623	-0.374	0.019	-0.191	0.190
LAR	-0.032	0.893	0.600	0.005	0.304	0.005
B. External						
RGDOGR	-0.006	0.966	0.206	0.219	0.090	0.416
IR	0.186	0.049	0.135	0.187	0.169	0.024
Adjusted R^2	0.79	-	0.89	-	0.68	-
F-statistic	48.47	0.0000	41.34	0.0000	29.05	0.0000

4.1.1 Risk Measures

Bank measure of credit risk (CR) defined as impaired loans provision in total credit facilities and regulators measure of risk defined as risk-weighted assets in total assets (RISK) are both significant at any level. Banks are much more sensitive to their own measure of risk compared to the Basel measure. The coefficient of credit risk is – 1.34 compared to – 0.254 for the regulatory risk measure even though this measure includes in addition to credit risk, operational and

market risks. The negative sign is expected given that both measures of risk are defined in terms of assets, and when assets increase, CAR and CAR1 decrease by definition.

Since Jordanian banks are overcapitalized, even if CAR decreases, it can still be higher than the required level. Moral hazard implies that at times of increasing risk, the costs of both equity and debt go up, but since deposits are usually protected, at least partially, and the cost of debt is significantly cheaper, banks prefer more leverage to equity. Banks want to avoid issuing equity capital whenever risk is high because cost is high. Interestingly, banks are more responsive to their assessments of risk compared to regulatory risk assessments. This result is reported by Okuyan (2013) and Bokhari, Syed & Khurram (2012), Aktas et al. (2015), Hafez and El-Ansary (2015), Olarewaju and Akande (2016).

4.1.2 Size

Bank size is also highly significant, the sign is as expected with a coefficient of – 0.25. This confirms the existence of a moral hazard behavior. Systematically important banks feel that they are too big to fail and that they are well diversified therefore they do not need to hold large amounts of capital for risk mitigation purposes. This result is confirmed by Aktas et al. (2015), Hafez and El-Ansary (2015) and Bateni et al. (2014). Olarewaju and Akande (2016).

4.1.3 Performance

Return on average assets (ROAA) has the biggest impact on CAR1 with a coefficient of +9.67. The sign is expected and implies that as performance improves, CAR1 improves as well. This is similar to Aktas et al. (2015), Bateni et al. (2014) and Olarewaju and Akande (2016). Return on average equity (ROAE) is used as a measure of cost in this study in order to differentiate between the performance effects from the cost effect. As expected, there is a negative relationship between ROAE and CAR1 which is confirmed by Olarewaju and Akande (2016). Bateni et al. (2014) report a positive impact.

4.1.4 Activity Ratios

Accepting deposits is a major bank activity, the ratio of deposit to assets is a risk indicator. If the ratio increases, leverage increases and banks become riskier which decreases CAR1 and requires the injection of additional capital, this is similar to Buyuksalvarci and Abdioglu (2011), Aktas et al. (2015) and Olarewaju and Akande (2016). Moral hazard is also present as bankers usually prefer debt to equity when raising funds. Since banks in Jordan are overcapitalized, they let the capital adequacy ratio decline as long as they are in compliance with regulation. The loan to deposit ratio is a measure of activity and liquidity risk. As this ratio increase, liquidity declines and CAR1 declines like the findings in Olarewaju and Akande (2016). Moreover, the loan to asset ratio also has the opposite to the expected sign, banks raise CAR1 whenever this ratio goes up which is in line with Bateni et al. (2014).

4.1.5 Economic Activity

Both the GDP and inflation rate are not significant.

4.2 Model 2 (CAR)

This model is estimated for robustness purposes, results are reported in Table 7. The Central Bank of Jordan requires banks to keep a total ratio of 12 percent of RWA. During the period 2007-2016, banks maintained an average of 18 percent. Table 6 reports the results of the fixed effect estimation with CAR as the dependent variable. Adjusted R^2 is 88 percent and F-statistic is significant at 1 percent level. The coefficients and significance levels are the same as in model 1. This model confirms the results of Model 1 (CAR1).

Table 7. Panel Regression Results of Model 2 (CAR)

Variable	Pooled Regression		Fixed Effect OLS		Random Effect	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
A. Internal						
CR	-0.761	0.008	-1.163	0.000	-0.869	0.001
RISK	-0.280	0.000	-0.242	0.000	-0.258	0.000
Size	-0.020	0.000	-0.055	0.000	-0.021	0.000
ROAA	12.588	0.000	9.398	0.000	11.515	0.000
ROAE	-1.732	0.000	-1.377	0.000	-1.639	0.000
DepAr	0.267	0.094	-0.375	0.057	0.007	0.967
LoanDep	0.202	0.135	-0.373	0.019	-0.034	0.796
LAR	-0.295	0.206	0.591	0.028	0.057	0.800
B. External						
RGDOGR	-0.026	0.837	-0.088	0.552	0.047	0.670
IR	0.068	0.461	0.001	0.991	0.084	0.276
Adjusted R^2	0.79	-	0.86	-	0.73	-
F-statistic	48.45	0.0000	36.03	0.0000	32.23	0.0000

5. CONCLUSION

Capital adequacy is affected by 3 fundamental factors; risk, return and activity. Risk indicators drive the capital adequacy ratios downward, credit risk however is the most influential followed by liquidity risk and the Basel's definition of risk (RWA/total assets). Return on average assets has the biggest impact among all factors with a coefficient of 9.7, banks fuel their capital internally following a pecking order mechanism. Return on average equity is a cost factor; banks avoid issuing capital whenever cost of common equity is high. Jordanian banks are well capitalized for fundamental reasons rather than for regulatory reasons such as keeping buffers against falling below the minimum requirements. This is evident from the inverse relationship with ROAE and the strong positive relationship with ROAA. Keeping a minimum buffer to prepare against falling below the minimum regulatory requirements does not seem to be a priority. Moral hazard exists in form of "too big to fail" from large banks.

Finally, whenever the activity factor, loan to assets ratio, increases, banks increase the capital ratios. This finding is in line with the results reported in Gropp and Heider (2010) and Allen et al. (2011) and confirms that they are reacting to fundamental factors more than regulatory limits. This study focuses on the Tier 1 ratio while almost all research studies focus on the total ratio; this is one of the contributions of this paper. Tier 1 is considered pure capital because it creates the market discipline and is first used to protect banks against their losses. Limitation is that the ratios are in accordance with Basel II, future research needs to investigate the issue using Basel III standard and investigate why banks are overcapitalized. Future research may also look for answers to the adequate capital level as Basel standards failed to protect banks from financial crises. The case of Jordan provides an evidence that Basel's requirements are not binding. That is, 8 percent and 4 percent for total and primary ratios, respectively, are minimal and Basel committee should consider raising them significantly.

AUTHOR BIOGRAPHY

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