

A study on relationship between CAMELS indexes and risk taking: A case study of Iranian banking industry

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CHRONICLE

Article history:

Received October 29, 2012
Received in revised format
1 March 2013
Accepted 4 March 2013
Available online
March 6 2013

Keywords:

Risk taking
Risk management
Performance assessment
CAMELS indicators

ABSTRACT

Among the activists of the money market, banks as the most important financial institutions undertake an important role in optimal appropriation of financial short-term resources. Furthermore, they allocate the short-term surplus funds to enterprises, which have a short-term need. Holding a main part of the funds in economy circulation, banks have a critical role in adjustment of economic relations. Banks are facing different types of risks in their daily operations. In the banking system, the CAMELS indicators are used to evaluate and rate of the performance of banks. The CAMELS rating model is one of the most effective systems of financial assessment in banks. Therefore, in this research, the effects of CAMELS indicators of banks on risk taking of Iranian banks are studied. The statistical population of the national banking system includes all governmental and private banks. The whole statistical population is studied as a research sample during 2006-2011. Taking into consideration the fact that the research data or section-bounded and time-bounded, a combinational regression analysis has been used. The results of the combinational regression analysis have supported the presence of a reverse and meaningful effect of the indicators of assets quality and sensitivity of market risk on risk taking in national banks. In addition, the results have supported the direct and meaningful effects of capital sufficiency and quality of profit-making on risk taking, however, the effects of the indicators of management quality and liquidity quality on risk taking have been rejected.

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1. Introduction

Banking industry has been considered as the most important financial institutions undertake an important role in optimal appropriation of financial short-term resources (Khan, 1997; Al-Jarhi & Iqbal, 2001). According to Dang (2011) banking supervision has become important because of significant loan losses and bank failures from the 1980s till now. CAMEL is one of the most important tools for investigating the safety and soundness of banks, and helps mitigate the potential risks, which could lead to bank failures.

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doi: 10.5267/j.msl.2013.03.006

Dang (2011) performed an empirical study of American International Assurance Vietnam (AIA) where the primary objective was to determine whether the CAMEL framework played an essential role in banking supervision or not. The study also identified the advantage as well as drawbacks, which the CAMEL system brings to AIA. The results concluded that CAMEL rating system was a useful supervisory tool in the U.S and CAMEL analysis method was beneficial as it is an internationally standardized rating and provided flexibility between on-site and off-site examination. Therefore, it was the primary model in evaluating banks' performance in AIA.

Babar and Zeb (2011) in an investigation investigated CAMEL rating system for banking industry in Pakistan and tried to find whether CAMELS system provide similar rating as PACRA system in assessing the performance of banks in Pakistan or not. According to Sarker (2005), Islamic banking as a new paradigm started in Bangladesh in 1983 and within few months, 6 more banks were built in that country and there has been a growing concerns on the goal of Islamic Shariah. Sarker (2005) investigated and made some recommendations on the more pertinent of some controversial issues on Islamic banking and suggested that micro, small, and medium enterprises (MSMEs) should get priority in the investment decisions of the Islamic banks.

Bikker and Metzmakers (2005) investigated on how bank provisioning behavior was associated with the business cycle, using 8000 bank-year data from 29 OECD countries over the past decade. Provisioning turned out to be substantially higher when GDP growth is lower, indicating increased riskiness of the credit portfolio when the business cycle turns downwards, which also increased the risk of a credit crunch. This effect was mitigated somewhat as provisions rise in times when earnings were higher, implying income smoothing, and loan growth was higher, indicating increased riskiness.

According to Gorton (2009), "the credit crisis was sparked by a shock to fundamentals, housing prices failed to rise, which led to a collapse of trust in credit markets. In particular, the repurchase agreement market in the U.S., estimated to be about \$12 trillion, larger than the total assets in the U.S. banking system (\$10 trillion), became very illiquid during the crisis due to the fear of counterparty default, leaving lenders with illiquid bonds that they did not want, believing that they could not be sold. As a result, there was an increase in repo haircuts (the initial margin), causing massive deleveraging." Gorton (2009) studied this indirectly, by studying at the breakdown in the arbitrage foundation of the ABX.HE indices during the panic. They reported that when the ABX prices plummeted, the arbitrage relationships linking the credit derivatives linked to the index and the underlying bonds broke down because liquidity evaporated in the repo market.

Sinkevicius and Greenawalt (1991) performed a regression analysis and reported that loan-loss rates in 1987 were positively associated with loan rates, volatile funds, and loan volume from the preceding three years. Palvia et al. (2009) exploited a large panel of U.S. commercial banks to investigate the association between Chief Executive Officer (CEO) and Chairperson gender and bank risk-taking during the recent financial crisis. They postulated that female executives could constrain excessive risk-taking in commercial banks, and could thereby reduce default risk during periods of market stress. Their results also indicated that banks with female CEOs were more conservative and could hold higher levels of equity capital. The positive relationship between female CEOs and capital ratios was strongest in smaller banks, and weak or non-existent in larger banks.

Victoravich et al. (2011) investigated whether bank risk was a factor impacted by chief executive officer (CEO) power and equity incentives and the interaction between these factors over the period 2005-2009, which marked the unraveling of the financial crisis. CEO power was measured with an index, including five underlying variables such as CEO duality, a staggered board of directors, etc. They found that firm specific risk was decreasing with CEO power and equity incentives in the form of CEO equity compensation and future firm wealth. The findings recommended that when a CEO had more power, they could impact the board's decision-making to their benefit in reducing risk. They also detected that CEOs with more power took on higher levels of firm risk when they had

greater levels of future firm wealth in the form of unexercisable options. Berger and Udell (2004) examined a new hypothesis that could help describe the procyclicality of bank lending. They tested this hypothesis and the results supported the hypothesis, although there were differences by bank size class. Laeven and Levine (2009) conducted the first empirical assessment of theories concerning risk taking by banks, their ownership structures, and national bank regulations. They reported that the same regulation had different influences on bank risk taking depending on the bank's corporate governance structure.

2. The proposed study

The CAMELS rating model is one of the most effective systems of financial assessment in banks. Therefore, in this research, the effects of CAMELS indicators of banks on risk taking of Iranian banks are studied. The statistical population of the national banking system includes all governmental and private banks. The whole statistical population is studied as a research sample during 2006-2011. Taking into consideration the fact that the research data is section-bounded and time-bounded, a combinational regression analysis has been used. The proposed model of this paper uses the following model,

$$RT_{i,t} = \beta_0 + \beta_1 CA_{i,t} + \beta_2 AQ_{i,t} + \beta_3 MQ_{i,t} + \beta_4 EQ_{i,t} + \beta_5 LQ_{i,t} + \beta_6 SM_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $RT_{i,t}$ is risk taking, $CA_{i,t}$ represents capital adequacy, $AQ_{i,t}$ shows asset quality, $MQ_{i,t}$ is management quality, $EQ_{i,t}$ shows earning quality, $LQ_{i,t}$ demonstrates liquidity quality, $SM_{i,t}$ represents sensitivity market and finally $\varepsilon_{i,t}$ is the residuals. In this survey, to measure risk taking, Z-score is used where $Z = (ROA + CAP)/\sigma_{ROA}$ and here ROA represents return of assets, CAP shows the ratio of capital to total assets and σ_{ROA} shows standard deviation of ROA . Table 1 shows some of the basic statistics associated with the proposed study of this paper.

Table 1
Descriptive Statistics

	N Statistic	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
RT	105	13.389	9.254	85.645	1.164	4.939	1.127	2.411
CA	105	0.109	0.119	0.014	2.871	12.180	8.539	18.273
AQ	105	14.491	6.882	47.367	-0.019	-0.082	-0.404	-0.864
MQ	105	0.851	0.519	0.269	2.325	9.862	5.762	12.330
EQ	105	0.469	0.229	0.052	1.411	5.986	2.052	4.392
LQ	105	0.524	0.130	0.017	-0.194	-0.824	2.247	4.808
SM	105	13.642	8.795	77.344	0.561	2.378	-0.167	-0.358

The results of Table present the implementation of three tests including Kolmogorev-Smirnov, Shapiro-Wilk and Jarque-bera tests. Based on the results of Table 2, we may assume that most independent variables are normally distributed.

Table 2
The results of Kolmogorev-Smirnov, Shapiro-Wilk and Jarque-bera tests

	N	Jarque-bera test		Shapiro-Wilk		Kolmogorov-Smirnov	
		Level of significance	Statistics	Level of significance	Statistics	Level of significance	Statistics
CA	105	0.000000	422.3392	.000	.604	.000	.274
AQ	105	0.650731	0.859319	.100	.979	.120	.078
MQ	105	0.000000	221.3878	.000	.700	.000	.230
EQ	105	0.000000	49.10603	.000	.882	.000	.156
LQ	105	0.000048	19.86938	.004	.961	.049	.087
SM	105	0.062495	5.545340	0.006	.964	.200	.064

In addition, we need to know whether we need to choose pooled or panel data and Table 3 shows the results of our survey.

Table 3

The results of Chow and Hausman tests

	Chow		Chi-square	Sig.	Results	Hausman		Error level
	F-statistics	Sig.				Chi-Square		
Pooled	0.249478	0.9391	1.398981	0.9244	Equal intercept			
Panel	27.20128	0.0000	212.15228	0.0000	Unequal slope	12.512864	0.0515	Fixed effect

In addition, the results of F-statistics given in Table 4 indicate that we can assume a linear relationship and the result of Durbin-Watson shows that there is no auto correlation among residuals.

Table 4

The results of statistical tests

Model	Linear relationship		Durbin-Watson		Residual test	
	F-statistics	Sig.	Obtained	Desired	J B	P-Value
1	26.89926	0.000000	1.557797	1.5-2.5	220.6803	0.000000

Finally, we need to make sure there are no strong correlations among independent variables and Table 5 summarizes the results of our survey.

Table 5

The results of correlations among dependent variables

	CA	AQ	MQ	EQ	LQ	SM
CA	1	-.744	.323	-.349	.335	-.534
AQ	-0.704	1	-.399	.202	-.304	.554
MQ	0.323	-.399	1	.282	.214	-.064
EQ	-0.349	.202	.282	1	.305	.661
LQ	0.335	-.304	.214	.305	1	.197
SM	-0.534	.554	-.064	.661	.197	1

Based on the results of Table 5, we could make sure that there are no strong correlations among independent variables.

3. The results

In this section, we present details of our findings on testing different hypotheses of this survey based on the implementation of regression analysis on Eq. (1). Table 6 summarizes the results of our survey on regression analysis.

Table 6

The summary of regression analysis

Par.	Variable	Description	Coefficient	Std. error	t-student	P-value
β_0	c	Constant	17.05538	2.009526	8.487266	0.0000
β_1	CA	Capital adequacy	27.17168	9.867962	2.753524	0.0073
β_2	AQ	Asset quality	-0.089902	0.043996	-2.043416	0.0443
β_3	MQ	Management quality	-0.520255	1.224855	-0.424748	0.6722
β_4	EQ	Earning quality	3.453903	1.840086	1.877034	0.0642
β_5	LQ	Liquidity quality	-6.186266	6.256310	-0.988804	0.3258
β_6	SM	Sensitivity market	-0.241522	0.062409	-3.869968	0.0002

Important statistical tests including R-Square, F-value and Durbin-Watson are 0.89, 26.9 and 1.56, respectively. These results confirm the regression analysis and we can rely on the coefficients.

3.1. Testing the first hypothesis: The relationship between CAMELS and RT

Since *RT* is the dependent variable in Eq. (1), we verify the following hypotheses,

$$\begin{cases} H_0 : \beta_{CA}, \beta_{AQ}, \beta_{MQ}, \beta_{EQ}, \beta_{LQ}, \beta_{SM} = 0 \\ H_1 : \beta_{CA}, \beta_{AQ}, \beta_{MQ}, \beta_{EQ}, \beta_{LQ}, \beta_{SM} \neq 0 \end{cases}$$

Since the coefficients of four variables, CA , AQ , EQ and SM are statistically significance with $\alpha=0.05$, we may somehow confirm the main hypothesis of this survey. There are also six sub-hypothesis associated with the proposed study of this paper, which are investigated accordingly. Note that the null hypothesis for all sub-hypotheses is that there is no relationship between the independent variable and dependent variable (RT) and the alternative hypothesis states the opposite one.

3.1.1. The first sub-hypothesis: the relationship between RT and CA

The first sub-hypothesis considers whether there is any meaningful relationship between RA and CA . The result of testing this hypothesis is as follows,

$$\begin{cases} H_0 : \beta_{CA,RT} = 0 \\ H_1 : \beta_{CA,RT} \neq 0 \end{cases} \Rightarrow \{\beta = 27.1716, T = 2.753, t_{ob} > |t_c|, 2.753 > |1.96, 2.58|, p = .0073\}$$

The result of t-student indicates that the relationship is statistically significance with $\alpha=0.05$. Therefore, the first sub-hypothesis is confirmed.

3.1.2. The second sub-hypothesis: the relationship between RT and AQ

The second sub-hypothesis considers whether there is any meaningful relationship between RA and AQ . The result of testing this hypothesis is as follows,

$$\begin{cases} H_0 : \beta_{AQ,RT} = 0 \\ H_1 : \beta_{AQ,RT} \neq 0 \end{cases} \Rightarrow \{\beta = -0.0899, T = -2.0434, t_{ob} > |t_c|, -2.0434 > |1.96, 2.58|, p = .0443\}$$

The result of t-student indicates that the relationship is statistically significance with $\alpha=0.05$. Therefore, the second sub-hypothesis is accepted.

3.1.3. The second sub-hypothesis: the relationship between RT and MQ

The third sub-hypothesis considers whether there is any meaningful relationship between RA and MQ . The result of testing this hypothesis is as follows,

$$\begin{cases} H_0 : \beta_{MQ,RT} = 0 \\ H_1 : \beta_{MQ,RT} \neq 0 \end{cases} \Rightarrow \{\beta = -0.5202, T = -0.4247, t_{ob} < |t_c|, -0.4247 < |1.96, 2.58|, p = .6722\}$$

The result of t-student indicates that the relationship is not statistically significance with $\alpha=0.05$. Therefore, the null hypothesis is accepted, which means there is no relationship between management quality and risk taking.

3.1.4. The fourth sub-hypothesis: the relationship between RT and EQ

The fourth sub-hypothesis considers whether there is any meaningful relationship between RA and EQ . The result of testing this hypothesis is as follows,

$$\begin{cases} H_0 : \beta_{EQ,RT} = 0 \\ H_1 : \beta_{EQ,RT} \neq 0 \end{cases} \Rightarrow \{\beta = 3.4539, T = 1.8770, t_{ob} < |t_c|, 1.8770 < |1.96, 2.58|, p = .0642\}$$

The result of t-student indicates that the relationship is statistically significance only with $\alpha=0.10$. Therefore, the null hypothesis is rejected, which means there is a meaningful relationship between earning quality and risk taking.

3.1.5. The fifth sub-hypothesis: the relationship between RT and LQ

The fifth sub-hypothesis considers whether there is any meaningful relationship between RA and LQ . The result of testing this hypothesis is as follows,

$$\begin{cases} H_0 : \beta_{LQ,RT} = 0 \\ H_1 : \beta_{LQ,RT} \neq 0 \end{cases} \Rightarrow \{\beta = -6.1862, T = -0.9888, t_{ob} > |t_c|, -0.9888 < |1.96, 2.58|, p = .3258$$

The result of t-student indicates that the relationship is not statistically significance with $\alpha=0.05$. Therefore, the null hypothesis is accepted, which means there is not any meaningful relationship between liquidity quality and risk taking.

3.1.6. The sixth sub-hypothesis: the relationship between RT and SM

The fifth sub-hypothesis considers whether there is any meaningful relationship between RA and LQ. The result of testing this hypothesis is as follows,

$$\begin{cases} H_0 : \beta_{SM,RT} = 0 \\ H_1 : \beta_{SM,RT} \neq 0 \end{cases} \Rightarrow \{\beta = -0.2415, T = -3.8699, t_{ob} > |t_c|, -3.8699 > |1.96, 2.58|, p = .0002$$

The result of t-student indicates that the relationship is statistically significance with $\alpha=0.05$. Therefore, the null hypothesis is rejected, which means there is a meaningful relationship between sensitivity management and risk taking.

4. Conclusion

In this survey, we have investigated the relationship between CAMELS index and risk taking. The study also considered the relationship between risk taking and six independent variables including capital adequacy, asset quality, management quality, earning quality, liquidity quality and sensitivity market. The results of this survey have confirmed the main hypothesis. We hope the results of this survey could help banking industry to make better managerial decisions.

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