EVALUATION OF THE CORRELATION BETWEEN CASH FLOW AND CREDIBILITY RISK IN THE KMV MODEL AT THE SAMAN BANK

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Abstract: This study evaluates the relationship between cash flow and credibility risks. Evaluation of theories in collect with data strategies is published by way of reports of the stock exchange and the Modern Strategies software at the Saman Bank. F statistics showed that the possibility for model prediction is confirmed using the panel method. Meaningful correlation was found between cash flow and credibility risks in the KMV model. Additionally, meaningful correlation exists between level of cash flow and power of credibility in the Saman Bank with a 0.03 coefficient. Also meaningful and positive correlation exists between increase and promotion of profitability in the Saman Bank and granting of facilities to rightful customers with a coefficient of 0.06.

Keywords: Credit Risk, Cash Flow Risk, Saman Bank

1. Introduction

Now a day, cash flow management is one of the greatest challenges faced by today's banking system. The main reason for this challenge is that most banking resources are financially procured by way of short term deposits. In addition, banking granted facilities are spent for investment in assets that have a relatively low fluidity grade (Rostamian & Haji Babaii, 2009). The importance of risk management leads to its increased value for financial agencies. In addition, bitter experiences of some countries such as south-western Asian countries or even western countries leads to increased attention of directors and law makers towards this topic. Political and economic instability in the world due to events such as emergence of information technology and creation of rapid changes in banking environments has doubled financial agency risks such that these factors lead to increased importance of risk management and attention of researchers to this arena. Adequate performance of each risk management responsibility needs strong and scientific tools. Banks face various forms of risk from among which four credit, cash flow, market and operational risks exert the highest amount of harm to their corpus (Ardakani, 2014). Credit risk is important and sensible in monetary and credit organizations because resources used for allocation in fact constitute debt of monetary organizations to asset holders, people and banks and their lack of fluidity can weaken the power of accreditation and payment of debt particularly as mentioned in the balance sheet and credit facilities as due sums and private savings accounts are considered as future endowment. In other words, collection of debts is impossible at multiple time points but payment of endowments (savings) is mandatory at each stage. Otherwise, the monetary organization will encounter bankruptcy (Ebrahimi &Colleagues, 2009).

Additionally, fluidity risk is also one of the most prevalent risks that banks encounter and correct management of cash flow with the purpose of preventing wasting of capitalization opportunities, use of excess fluidity for investment and granting of new facilities for acquisition of increased return, preparedness for encountering situation of crisis and deficit in cash resources is a necessity. For correct management of fluidity, it is necessary that appropriate tools and effective factors for this task are identified (Jaiswal, 2010). Financial crisis (2008) showed that serious increase in delinquency alongside with decrease in and omission of bank fluidity leads to serious problems in the financial system. In an FDI (Federal Deposit Insurance Corporation) report, the main reason for bankruptcy of close to half of 251 trade banks who have announced it between August 2007 and September 2010 has been decreased fluidity and lack of availability of facilities.

Maybe this topic by itself is sufficient for analysis of internal performance of the connection between to risk factors. In addition, the classic theory of micro economy in banking confirms close correlation between fluidity and credit risk (Imbierowiczi, 2011). The main purpose of this research is determination of the relationship between the risk of fluidity and credit in the Samman Bank based on the value at risk. Additionally, the test of validity of the hypothesis of peaceful life cycle of the statistical sample is of statistical significance. If the hypothesis of this research is supported, one can with more especial attention to organizational space and better planning significantly help in the regard of desired implementation of management of fluidity of banks in this country.

2. Theoretical Bases of the Research

In past theoretical research, various classifications of risk have been presented. Based on the opinion of Sinkey (1992), bank risk and its management focuses on three credit issues of credit risk, interest rate and fluidity (Modares & Zekavat, 2003). Greuning and colleagues (1999) in a research in the World Bank have presented another classification of risk. This classification despite being introduced specifically with regards to risk evaluation in banks, topic and content wise capability of application for other trade institutes and organizations is also accomplished. Greuning in this model makes reference to the risk of events that in a way considers meaning of positive and negative changes in future interests and applies to four classes of risk financial, operational, business and incidental.

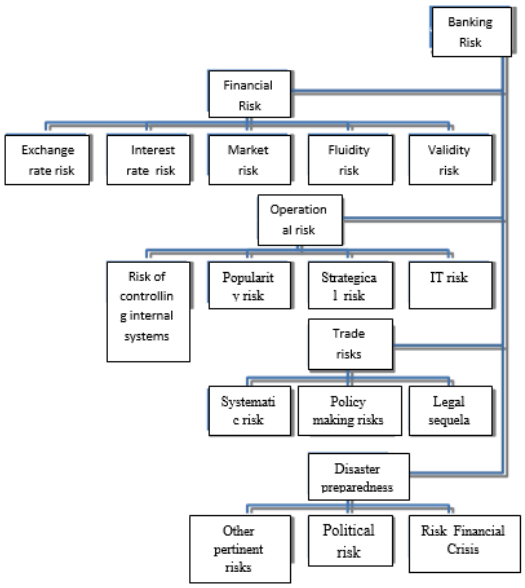

Figure 1. Analysis of risk of Banking (Greuning and Bratanvic, 2000)

Financial risks are those that are strongly dependent upon each other and in total increase overall bank risks (Asadipour, 2009). They are subdivided into two classes specific and market risks. Specific risk includes cash flow risks, credit risk, risk of capital structure and market risk includes interest rate, cash exchange and price fluctuations (Joel, 1999).

Various definitions of cash flow risk should be discussed as follows:

Cash flow risk is the inability of the bank to provide sums for granting of facilities of timely payment of responsibilities such as savings.

This risk emanates mostly from structure of assets and debts and its main source is lack of time compatibility between input and output channels to the bank. Therefore, cash flow risk can be divided into two group fluidity risk of assets and resources (Crouhy & Mark, 2007).

Cash flow risks of assets refer to inability of banks to sell their own capital to provide monetary needs that are not accounted for. The resource fluidity risk is also related to lack of absorption of the resources by banks in its regular way (such as attraction of savings or use of facilities and credit lines to banks) (Asadipour, 2009).

Cash flow is availability of cash sums or their equivalent. Therefore, it can be stated that cash flow risk is unpreparedness of the bank in provision of facilities or timely payment of its responsibilities (Banks, 2007). A bank has fluidity when it can achieve with an acceptable expenditure sufficient sums both by way of increased debts and transformation of cash assets to money rapidly (Falconer, 2001).

Risk Management: In Table 1, various risks in banking systems and their methods of management have been presented (Mehrabi, 2010).

Table 1. Various risks in banking systems and their methods of management

Methods of Management	Various Kinds of Risk
Creation of appropriate structure for loans and necessary precautions for protection of the interests of loaners, use of credit derivatives with facilities contracts, periodical reevaluation of banking assets, management of combination of facilities due to events that have occurred in the market or acquisition of further proof.	Credit risk
Evaluation, experiment and confirmation of announced market risks including interest rate, exchange, moderation and flow risks.	Market risk
Coverage of harms resulting from negligence and lack of efficiency of human resources, inefficiency of security measures, controls and technology, harms resulting from lack of awareness or lack of correct information, communications, executive risk of contracts and statutes and risk of trust and credibility with focus of control in reactive operations. This control aims to prevent any damages to information and on the other hand to resist access of exploiting individuals.	Operational risk
Estimation of the bank's cash needs in the future. This estimation can be performed based on the following three methods: estimation based on resources and use of cash sums, estimation based on structure of assets and debts and speed of their transformation to cash sums and estimation based on cash flow indices.	Cash flow risk

Credit risk: lack of commitment to guarantees by those who receive facilities (loans) or the second party to the banking contract based on criteria agreed upon in the agreement.

2.1 The KMV Model

One of the most applicable revising models is the Blake-Shultz-Merton which in practice improves this model and is one that has been introduced by the Moody Company and is known as the KMV-Merton approach. This approach with moderation of the base BSM model is used for various debit groups and with various bills. According to this approach, solving of concurrency equations if the market is very fluctuating can lead to incorrect estimation and possibility of diagonal negligence. For this reason, KMV applies more complex repetitive strategies as compared to the BSM model in estimation of company value and its ups and downs.

In computation of possibility of negligence, the KMV-Merton approach instead of using interest rates without risk uses the expected return of company assets and instead of the boundary of error of the base model (B) uses a new negligence boundary which is equivalent to the current debt plus half of long term debts. Additionally, the value of the company stock (E) is directly estimated by way of the market. Next, the estimated sums are entered into the concurrency equations of BSM and the values for company value and return fluctuations are estimated and the distance to error is computed.

For the purpose of solving the optimal boundary of error in the KMV-Merton approach, Lee (2011) using the genetic algorithm endeavored to redefine the optimal boundary of this model. Lee's idea (2011) was that the error boundary can be different from one country to another and even within industries. Therefore, the main purpose of Lee's goal (2011) was introduction of a model that can more effectively and simply predict bankruptcy in the country of Taiwan. Lee (2011) named his model GA-KMV and defined the boundary of error as follows:

$$DPT_{GA-KMV} = \alpha * LD + \beta * SD \quad (1)$$

LD and SD are long term and short term debt respectively. The purpose of Lee (2011) was estimation of the optimal coefficients for these variables using concurrent use of the genetic algorithm and the Blake-Shultz-Merton concurrency equations model system. It should be noted that the KMV-Merton approach considers the short term debt coefficient to be one and the long term one to be 0.5.

2.2 Cash Flow Risk and Credit Risk

New research has made reference to financial crisis (2007-2008). The hypothesis of positive correlation between cash flow risk and credit risk is thus confirmed. Examples of these researches are those of Diamond and Rajan (2003), Haigh and Iksoung (2010) and Arshia and Visvanatan (2011). Ambervitch and Rach (2011) in a research titled "Correlation between cash flow risk and credit risk in banks" evaluate the mutual relationship between cash flow risk and credit risk in all trade banks of the United States of America in the years 1998 to 2010.

In this research several indices of differentiation for credit and cash flow risks have been used in multiple analyses so any kind of probable correlation between these two risks are identified. In the first stage, a similar model is used for evaluation of the concurrent and non-concurrent correlation between two sources of risk in American banks. At the second stage, cash flow risk reaction in response to credit risk environment changes outside of the bank was evaluated. The reason is that it is one of the most prominent cases of financial crisis in 2007. At the last stage, distinct and combination effects of credit and cash flow risks on probability of bankruptcy of the banks was computed

using the Log it test model for all 254 trade banks. Results showed that a two ways positive correlation but a weak one exists between credit and cash risks (these findings have been obtained based on utilization of specific bank risk scales). Analyses of cash flow within banks and credit risk external to the bank confirms strong and positive correlation between these two factors. Ultimately, it was shown that both sources of risk not only independently but also together influence probability of bank error.

Diamond and Rajan Mali (2007) in a research titled "Risk of cash flow, creation of cash flow and fragility" have made the assumption that assets do not have capability of fluidity and granting and acquisition of facilities is also a topic based on ability and knowledge of an individual. The bank receives money from depositors and can mortgage this loan money. A problem arises when numerous economic projects financially procured by way of facilities are unable to successfully pay back their facilities and the bank is unable to respond to the demand of depositors. Therefore, banks pay higher interest to depositors to absorb their capitals. Additionally, granting of facilities with lower interest rate is surrendered and benefactors are requested to return their loans and ultimately projects that have been financially supported by way of un- returned facilities cannot achieve high value (therefore, the value of facilities is also decreased).

Yet, with this decrease in value of assets, increased numbers of investors remove their capitals from the bank. Therefore, the main conclusion is that with lack of repayment of facilities, higher credit risk and depositor take over lead to higher risk of bank other funds. With attention to research and the fact that now a day cash flow management is one of the most important challenges encountered by banking systems, we wish to identify the main reason for this challenge. The reason is that most resources of banks are financially procured by way of short term deposits. In addition, facilities granted to banks are spent on investment in assets such as the stock exchange (Rostamian & Hajibabaii, 2009).

Therefore, for higher understanding of banking risks and factors influential on them, this research aimed to respond to the question that "Is there a meaningful correlation between fluidity risk and credit risk in the Samman Bank?"

3. Research Methodology

The method of this research when it comes to data collection and implementation was a descriptive study and statistical analysis was of correlation type. Correlation between variables was investigated retrospectively. In this research, statistical population included the member companies accepted in the Tehran Stock Exchange that have had taken advantage of short and long term financial facilities of internal banks. Statistical sampling has also been non-randomly and by way of screening. In other words, selection of sample members is performed by way of omission of newly accepted companies and those with prolonged contractual interruptions (more than 70 days). Additionally, data was collected from published reports of the stock exchange between the years 2005 and 2014 and searching the Rahavard Novin Software. Data description was performed using distribution tables and histograms and pie charts. Additionally, for better presentation of the data, indices of central tendency and distribution were taken advantage of. In this research, hybrid of asset-debit of banks that have been defined and quantified using financial rations and indices was assigned as the research independent variable and cash flow and credit risks computed by financial ratios as dependent research variable. The method of hypothesis testing in this research was the Data Time Series Panel Method and the Eviews 7 software was utilized. Research model is as follows:

$$ER_i = R_F + (ER_M - R_F)\beta_{Mi} \quad (2)$$

Ri: Assets return, Rf: Riskless return, Rm: Market return, E: Mathematical error. The market beta for each stock is extruded form the following formula:

$$\beta_{Mi} = \frac{cov(R_i, R_M)}{var(R_M)} \quad (3)$$

Therefore, for testing the first model regression is used as follows:

$$R_i = a_. + a_1\beta_{Mi} + \upsilon_i \quad (4)$$

In which:

ao= riskless return rate or RF, a1= stock return in excess ERM-RF, Ri= Observed stock return I, vi= Expected error or Ri-ERi

4. Research Findings

4.1 Evaluation of reliability of research variables

Using the method of estimated ordinary least squares (OLS), it is tested whether it is equal to 1 or not. The null hypothesis in the Philips Prune Test states that the variables under consideration lack reliability.

To reject the null hypothesis and reliability of each of the variables, it is sufficient that significance level is less than 0.05. Thus, results of reliability test for the panel data in Table (2) for both variables show complete stability over time.

Table 2. Results of reliability test for model variables

Philips Prune Test			
Variable	Statistics	Significance level	Result
Stock return	-6.85	0.000	Completely stable
Market beta	-7.39	0.000	Completely stable

In this research, the model has been estimated using hybrid data from banks under study. Initially, it should be determined whether in general there is need for consideration of the data panel structure (differences or specific bank effects) or data relevant to various banks can be obtained by the monetary method. To make a decision, the F statistics is used. Acceptance of the assumption of equality of stable specific bank effects and ultimately selection of the classic method or panel data method is undertaken. The Chow test (F statistics) has been shown in Table (3). Therefore, with a confidence of 95%, the null hypothesis can be rejected and the opposing hypothesis (H1)

is accepted. Therefore, it can be stated that possibility of model estimation using the panel method is confirmed.

Table 3. Results of the Chow test

Test statistics	DOF	Significance level	Result
4.92	(179, 19)	0.000	Use of the panel method

4.2 Estimation of need for another model

Considering that the null hypothesis for the Chow test stating equality of distances from origins, to decide whether constant effects or random ones exist or not, the Hausman test is used. As shown in Table (3), it is noted that significance level for the Hausman test has been calculated at higher than □=0/05. Thus, with confidence of 95%, random effects cannot be supported and probability of model estimation using random effects is not confirmed.

For evaluation of significance of the regression model, the F statistics is used. To reject the null hypothesis and conclude based on the model significance, it is sufficient for significance level to be less than 0.05 which is shown in Table (4). Additionally, the Durbin-Watson statistics if close to number 2 shows lack of statistical error in the model. With consideration of explanations given in the following table, model main correlation coefficients are shown in Table (5).

Table 4. Results of the Hausmann

Test statistics	Degrees of freedom	Significance level	Conclusion
1.17	1	0.27	Existence of constant factors

Table 5. Results of fitness of the regression model using constant effects

R= Response variable				
Independent variables	Regression coefficients	Standard deviation	Test statistic	Significance level
Formula constant (θ)	0.29	0.08	3.37	0.000
B	1.95	0.30	6.40	0.000
Test statistic F= 10.47, Significance level= 0.000, Determinant coefficient= 0.53, D.W. statistics= 1.93				

Table 6. Main estimation parametric

Statistics	Value	Conclusion
Durbin-Watson	1.93	Lack of series correlation in the model
F	10.47	Model goodness of fit
Determinant	0.53	53rd percentile changes in model dependent variable

4.3 Correlation between cash flow and credit risks

For evaluation of the correlation between cash flow and credit risks, initially two diagrams related to the two computed risks via the KMV model were drawn (Figure 2 & 3) and to evaluate the correlation between these two variables the Pearson's correlation test was applied. Before model estimation, model variables' correlation diagram can be very useful. Correlation shows linearity of model components. If the Pearson's correlation coefficient is higher than 0.7 and meaningful, then probability of linearity exists in the model. In the following tables, correlation between evaluated variables has been evaluated using the Pearson's test. In Table (7), level of correlation has been shown in the first row and its significance in the second. If significance is less than 0/.05, the correlation under investigation is statistically meaningful.

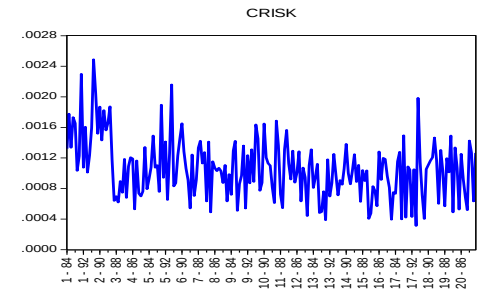

Figure 2. Credit risk

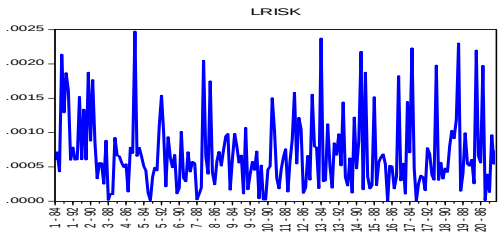

Figure 3. Cash flow risk

Table 7. Correlation between model variables

correlation	profitability	efficiency	credibility	cash flow risk	facilities	cash flow	credit risk	market beta
profitability	1.0000							
efficiency	0.964780 0.0000	1.0000 ----						
credibility	0.038203 0.0012	0.032289 0.0091	1.000000 ----					
Cash flow risk	0.094757 0.0020	0.119112 0.0130	0.035757 0.0052	1.0000 ----				
facilities	0.600000 0.0000	0.964780 0.0000	0.038209 0.0011	0.094758 0.0002	1.0000 ---			
Cash flow	0.420000 0.0000	0.964780 0.0000	0.038209 0.0012	0.094757 0.0010	0.330000 0.0000	1.0000 ----		

Credit risk	0.141228 0.461	0.233105 0.0009	0.194701 0.0057	0.102006 0.0006	0.141221 0.0461	0.141221 0.0461	1.0000 ----	
market beta	0.019541- 0.0036	0.010062- 0.0075	0.461438 0.0000	0.010258- 0.0051	0.019531- 0.0037	0.019533- 0.0037	0.188689 0.0075	1.0000 ----

Existence of correlation between variables signifies meaningful correlation between them during the period of investigation. Table (6) demonstrates that we can confidently state a meaningful correlation exists between cash flow risk and credit risk computed by the KMV model.

4.4 Evaluation of the main hypothesis of the research

Main hypothesis: Meaningful correlation exists between cash flow and credit risk computed by the KMV model (table 8).

Table 8. Evaluation of the correlation between cash flow and valuation

Correlation coefficient	Significance	Conclusion
0.102006	0.0006	Confirmation of the first main hypothesis

4.5 Minor hypotheses

Meaningful correlation exists between level of cash flow and valuation power in the Samman Bank (table 9)

Table 9. Evaluation of correlation between cash flow and valuation

Correlation coefficient	Significance	Conclusion
0.03	***	Confirmation of the first main hypothesis

Meaningful correlation exists between increase and promotion of profitability in the Samman Bank and granting of facilities to legal customers (Table 10).

Table 10. Evaluation of correlation between profitability and granting of facilities

Correlation coefficient	significance	conclusion
0.60	***	Confirmation of second main hypothesis

Meaningful correlation exists between rank of credit risk of legal customers in the Samman Bank and promotion of efficiency of the bank (Table 11).

Table 11. Evaluation of correlation between efficiency and credit risk

Correlation coefficient	significance	conclusion
0.23	***	Confirmation of third main hypothesis

5. Discussion and Conclusion

Based on the results obtained, credit risk with a coefficient of 0.1 is equal to 1.0 and has positive and meaningful effect on cash flow risk. Meaningful correlation exists between level of cash flow and valuation in the Samman Bank with a coefficient of 0.03. Positive and meaningful correlation exists between increase and promotion of profitability in the Samman Bank and granting of facilities to legal customers with a coefficient of 0.6. Meaningful correlation existed between credit risk ranking of legal customers in the Samman Bank and promotion of bank efficiency. Results of this research agreed with studies by Ardakani (2014) and Jafari and Fakhari (2014) and Gholami and Salimi (2014). Considering the results obtained and connection between credit risk and cash flow risks, creation of interaction between these two risks and correct planning in this regard is among most important duties of directors and supervisors of banks. Therefore, it is necessary that the financial organization takes steps in line with decreasing probability of unwanted risk arenas, pricing and more correct valuation, increased ease and accuracy in decision making, decrease in costs of capital and overall decreasing harm from influence of connection between risks and towards a unified risk management.

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