

Bank Risk-Taking and Market Risk: An Evidence of the Vietnamese Stock Market

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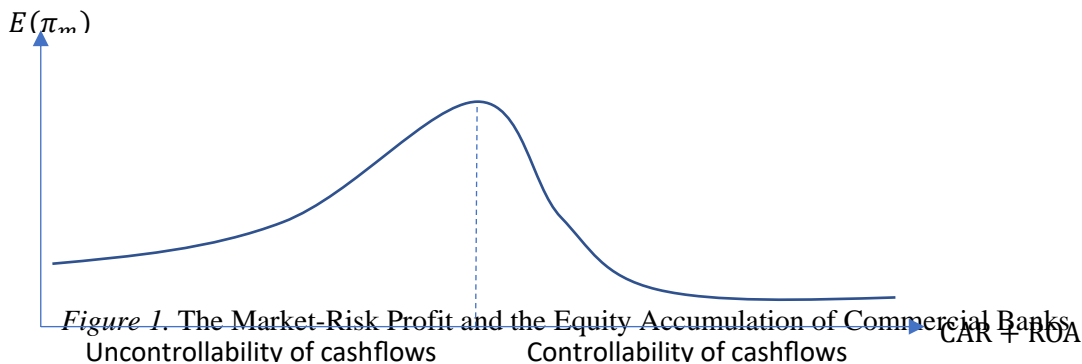
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Abstract: This article analyzes the relationship between bank risk-taking and market risk in the Vietnamese banking industry. The research methodology in the context is based on the evaluation formula of Modigliani and Miller to calculate the market return with equilibrium price, and then determine the response of bank risk-taking to market risk. The model uses data from banks listed on the Stock Exchange of Ho Chi Minh City to consider a key relationship between bank risk-taking and market risk and the result is that the uptrend of market return with equilibrium price is the response to bank risk-taking, and the breakdown uptrend of market return to formulate market risk leads to insolvency risk of Vietnamese commercial banks.

Keywords: bank risk-taking, market risk, market return with equilibrium

1. Introduction

Global financial crisis in period 2007 to 2009 had made the market risk loss and spread over all stock markets in countries, in which the Vietnamese stock market was also affected by a financial shock in early year 2008 when the Vietnamese State Bank withdrew back 20.3 billion VND from the stock market by issuing the Treasury Bills dated on 17th February 2008 imposed for commercial banks so that market uptrend was crashed suddenly in March 2008 due to the shortfall in the cashflow demand of investors on the abnormal market transaction, to make a buying vacancy of all stocks on the electronic board of Vietnamese Stock Exchange. Beyond this financial crisis in Vietnam, it could be found that the Vietnamese State Bank somehow plays the role of a bridge between the market uptrend and the market downtrend or between the bank risk-taking in the banking system and the market risk in the stock market by the monetary instruments of central banks, especially in the period of internal market risk that stock market has a signal of market uptrend crash in response to the increase in the equity accumulation of commercial banks. In the context of this research, we exploit the structure of market risk and bank risk-taking under the following problem statements:



Problem Statement 1. Capital regulation and market risk.

The capital regulation in the banking system used to affect the Vietnamese stock market in the financial crisis of the 2007 to 2009 period that the strong intervention of the Vietnamese State Bank in issuing Treasury Bills dated 17th February 2008 imposed for Vietnamese commercial banks to make the shortfall in real cashflows in March 2008 on the abnormal market transaction, but it is unknown that this is not the main reason for the Vietnamese market uptrend crash. Finding out some evidence about the capital regulation of Vietnamese commercial banks by the Vietnamese Government that signed Decree No. 141/2006 dated 22nd November 2006 before breaking down the market uptrend within the 15 months. Starting the phenomenon of abnormal market transactions happened from December 2006 to March 2007 with the radical speed of the inflation market price within 4 months since the promulgation of Decree No. 141/2006 at the market peak of Vn-Index 1170.7 point dated on 12th March 2007 to reflect a signal of the market uptrend crash that the market price was above the distribution of profitable cashflows to control the outside cashflows pumping into the stock market so that institutional investors could sell the overloaded quantity of stocks for the shareholders last holding stocks trapped with the inflation market price from April 2007 to February 2008.

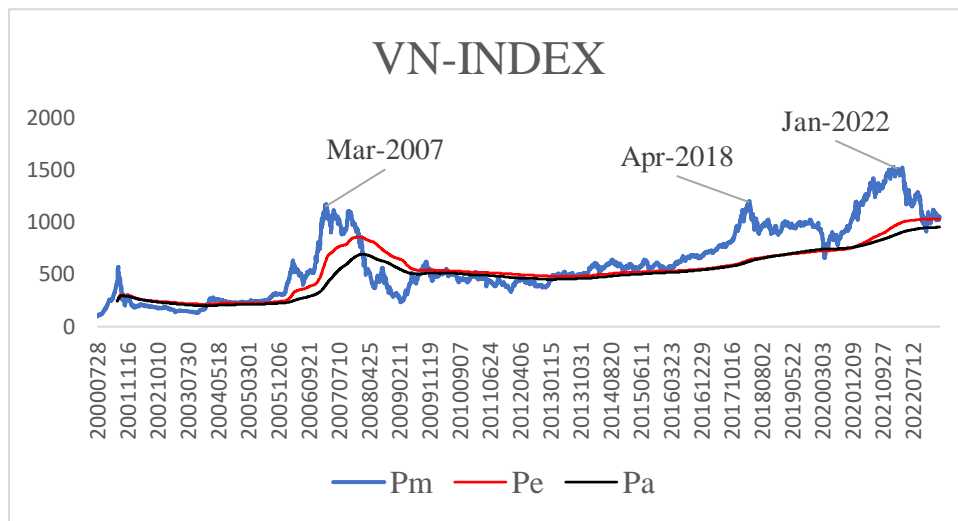


Figure 2. Stochasticity P_m , Equilibrium P_e , and Persistence P_a

In Figure 2, the authors suggest three key characteristics of the market price for seeking the effects of the cashflow demand and the stock supply on the market risk, including:

The stochastic market price P_m is the market price that could see on the electronic board of the Stock Exchange to reflect its continuous volatility which is distributed by the cashflow demand the investors buy and hold for the ownership and the stock supply the shareholders sell stocks for the profitability. But it is unknown that the stochastic market price does not exist any break-even market price to reflect the equality between the total benefits of selling stocks and the total costs of buying and holding stocks on the market transaction. Therefore, it only represents the change in market prices over time (Miller & Modigliani, 1961; Fama, 1965), shown in the following formula of market return:

$$R_m = \frac{\partial P_m}{P_m}, \quad (1)$$

where R_m is market return, P_m is market price with the note of change ∂ . If the research uses the market return in the formula (1) to measure the market risk, it is hard to test the maximum market-risk return due to the elimination of the market trend in which the internal market risk is defined as a signal of market

uptrend crash under the condition that the stochastic market price is much greater than the slope-up equilibrium market price, $P_m^{\uparrow\uparrow} \gg P_e^{\uparrow}$, or the stochastic market price is above the probability distribution of profitable cashflows in the stock market, or so-called the effect of the overloaded cashflow demand on the market risk.

The equilibrium market price P_e is the market price that represents the break-even market price between the total benefits of selling stocks and the total costs of buying and holding stocks on the market transaction. Upon this characteristic of market price, the equilibrium market price P_e removes the speculation out of the market price to reflect a break-even point between buyers and sellers in the whole process of market transaction. The formula of equilibrium market price is determined as follows:

$$P_e = \frac{\sum P_m Q_m}{\sum Q_m}, \quad (2)$$

in which the numerator $\sum P_m Q_m$ represents the demand of investors' cashflows buying and holding stocks normally, and the denominator $\sum Q_m$ represent the supply of shareholders' trading-volumes selling stocks normally. And the speculative market profit $\pi_s = P_m - P_e$ reflects a key fundamental principle that the shareholders want to sell stocks with the higher market price than the equilibrium market price for the profitability to reflect on the supply function of the equilibrium market price:

$$\pi_{s,t} = \hat{\pi}_s^0 + \hat{r}_s P_{e,t} + \hat{\varepsilon}_{s,t}, \quad (3)$$

where $\pi_{s,t}$ is speculative market profit at time t , $P_{e,t}$ is equilibrium market price at time t , $\hat{\pi}_s^0$ is estimated expected profit, \hat{r}_s is speculative market return and $\hat{\varepsilon}_{s,t}$ is modelling error. When the speculative market return is positive $\hat{r}_s > 0$, the supply function of equilibrium market price reflects the slope-up line in market uptrend for the profitability on the market transaction; or contrary, the speculative market return is negative $\hat{r}_s < 0$, the supply function of equilibrium market price reflects the slope-down line in market downtrend for the capital restructure or market recovery for the equity ownership.

Upon two prior market-price characteristics of stochasticity and equilibrium to explain the capital regulation throughout the equity accumulation $CAR + ROA$ of commercial banks in the period from Dec-2006 to Mar-2008 by the Government Decree No. 161/2006 related to the market risk of Vn-Index in Mar-2008, shown in Figure 3. Obviously, the profitability in risk management of banking system is controlled cashflows earlier than the profitability of other industries at time of internal market risk.

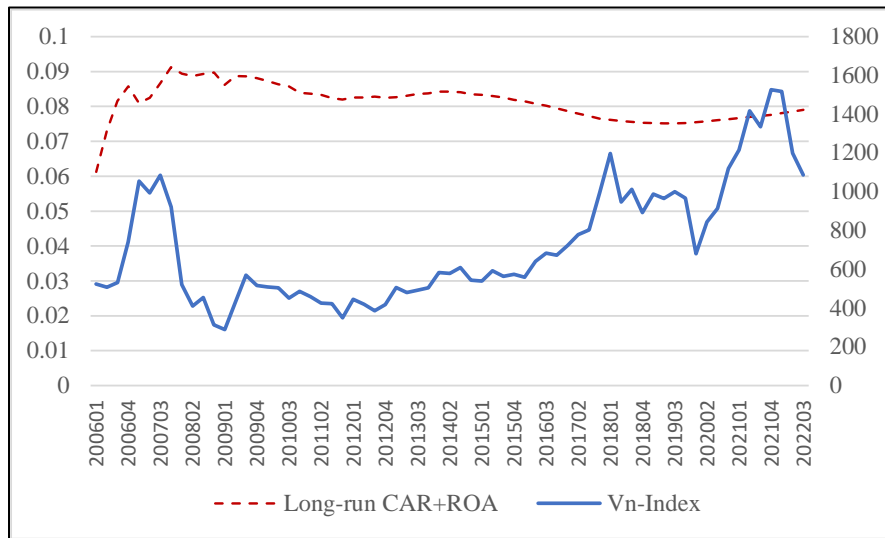


Figure 3. The Long-Run Equity Accumulation of Commercial Banks and the Vn-Index

And the third characteristic of market price is the persistent market price P_a to reflect the holding market price that investors could loosen their cashflows to buy and hold stocks for the equity ownership gradually from market downtrend to market recovery. The financial meaning of the ownership market profit $\pi_d = P_e - P_a$ is shown that the smaller ownership market profit is the more efficient holding stocks to represent the market recovery, $P_e = P_a$. In Figure 2, there are two periods to reflect the effect of the overloaded stock supply on the market risk at market peaks of Mar-2007 and Jan-2022 in market uptrend due to $P_e > P_a$. And the formula of persistent market price P_a is determined on stable market transaction:

$$P_a = \frac{\sum P_m \bar{q}_m}{\sum \bar{q}_m}, \quad (4)$$

where \bar{q}_m is average quantities of stocks, to reflect the demand function of the equilibrium market price:

$$\pi_{d,t} = \hat{\pi}_d^0 + \hat{r}_d P_{e,t} + \hat{\varepsilon}_{d,t}, \quad (5)$$

where $\pi_{d,t}$ is ownership market profit at time t , $P_{e,t}$ is equilibrium market price at time t , $\hat{\pi}_d^0$ is estimated expected profit for the ownership under the condition that $\lim \hat{\pi}_d^0 = 0$ is favorable for the equity ownership in market recovery, \hat{r}_d is ownership market return under the condition that $\lim \hat{r}_d = 0$ is favorable for the equity ownership in market recovery and $\hat{\varepsilon}_{d,t}$ is modelling error.

Seeking the capital regulation in banking system and the market risk in stock market upon the abnormal market transaction of a market cycle is a new approach to measure the effect of equity accumulation throughout the profitability on the market risk, in which the capital regulation of Vietnamese commercial banks is some evidence for the market uptrend crash of Vn-Index in Mar-2008.

Problem statement 2. Exceed deposit growth and market risk.

It is known that the capital regulation is the type of the abnormal equity accumulation in banking system that commercial banks could face the bank risk-taking. However, another bank risk-taking is due to the debt accumulation of commercial banks throughout the exceed deposit growth with the high deposit rate under the difficulty of economic activities so that it is usually attached to the phenomenon of bank-run in banking system. This is a situation that the activities of investment and business in banking system are stronger than the ones of investment and business in the market of commodities and services in a local economy to make the phenomenon of the more expensive money price than usual. Upon the high deposit rate, the people, firms, even managers of commercial banks usually store in the commercial banks to earn deposit interests rather than use money on activities of investment and business in the market of commodities and services. And the story of commercial banks' profitability in risk management is how to sell "the risks" for stakeholders last holding the risky financial assets trapped with the inflation market price. For instance, the market risk of Vn-Index at two latter market peaks of Apr-2018 and Jan-2022 was due to the insolvency risk of exceed deposit growth under the condition that the Vietnamese commercial banks expand more and more commercial bank branches spread over the cities and countryside in Vietnam to fund the available cashflows with the high deposit rate in banking system for leading corporations on the overpriced speculative assets, especially the real-estates whose the speculative market profit is hidden. It could be found that the real-estate products are the risky assets with high speculation, that their inflation market price is usually stimulated by real-estate brokers, but it is rarely to buy for the real needs of housing accommodation. And the critical value of the real estate price bubbles happens when spreading out the activities of the speculation over economies to make the uncontrollability of cashflows. Typically, the corporate bonds are all attached to the credit source of Vietnamese commercial banks, such as the corporate

bonds of Van Thinh Phat Corporation attached to the event of bank-run at the Saigon Commercial Bank (SCB) fallen into special controls by the Vietnamese State Bank; or the bidding price of the ThuThiem new city with the real-estate inflation price 2.4 bil. VND/m² to stimulate the price bubbles of neighbor real estates by Tan Hoang Minh corporations and others, etc. that uses from the debt sources of corporate bonds and commercial banks. Obviously, the formula of risk management “how to sell these risks for the bondholders last holding bonds trapped with the price bubbles, or “how to refinance corporate bonds by selling overloaded stocks for the shareholders last holding stocks trapped with the inflation market price. And, this situation is called as the indirect effect of the exceed deposit growth on the market risk.

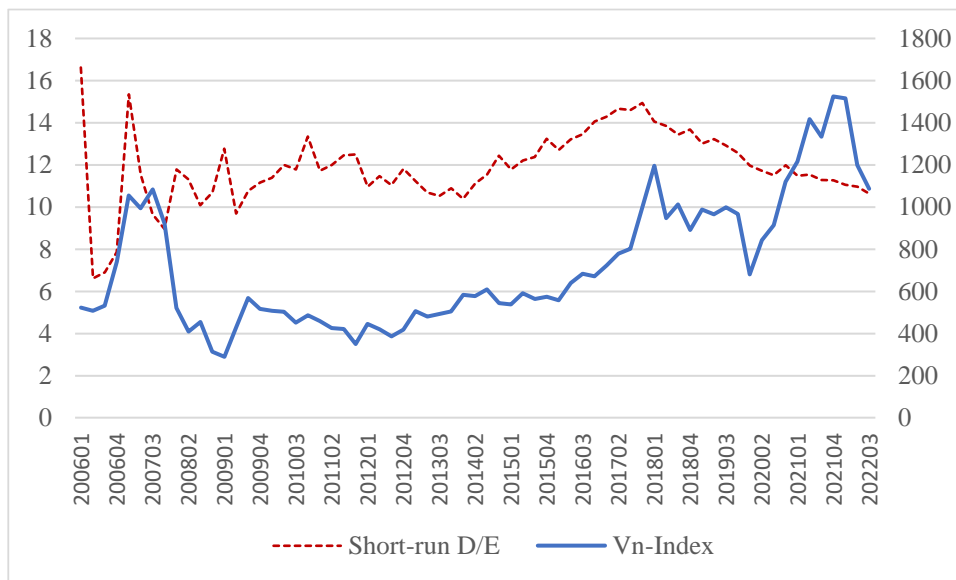


Figure 4. The Short-Run Debt Accumulation of Commercial Banks and the Vn-Index

In Figure 4, the pressure of the insolvency risk or the bank risk-taking on aspect of exceed deposit growth happened at the growth peak of II/2017 to make the speculative market profit in stock market from II/2017 to II-2018 to release the financial stress of commercial banks from the short-run deposits in banking system leading to forming the second market peak of Vn-Index in April 2018, and refinance the corporate bonds by selling the overloaded stocks to compensate the maturity debts of real-estate corporate bonds leading to forming the third market peak of Vn-Index in January 2022.

On two mentioned-above problem statements, the remainders of this paper for seeking the connection between the bank risk-taking in banking system and the market risk in stock market to generate the theoretical inferences for risk management of the banking system and the investment performance are organized as follows:

Section II. Literature Reviews, providing some definitions of the market risk and the bank risk-taking on practical models to propose the theoretical model.

Section III. Research Methodology, suggesting a new method for a connection between the market risk and the bank risk-taking, and then giving two conditions for examining the connection the market risk and the bank risk-taking.

Section IV. Conclusion.

2. Literature Review

In this section, the authors give some overviews of the market risk related to the activities of commercial banks that leads to the insolvency risk in banking system; and central banks are always a key between the market uptrend and the market downtrend to control cashflows in each market cycle by the financial instruments in banking system.

2.1 Definitions

First of all, the authors review some definitions of market risk related to activities of commercial banks. Gallati (2003) implies on the Bank of International Settlement that market risk is defined as the risk of losses in on- and off-balance-sheet positions arising from movements in market price; Dionne (2013) states on the viewpoint of banking system that market risk represents volatility of prices or asset returns so that the regulatory treatment of arbitrary capital asset on the market-risk loss makes a conflict between stakeholders and commercial banks; Bessis (2015) gives a definition that market risk is defined as the risk of losses due to adverse market movements depressing the values of the positions held by market players. Basically, the volatility of market price causes the loss of capital assets to force commercial banks to hedge the financial risks of these assets.

2.2 Practical Models of the Bank Risk-Taking and the Market Risk

In some reviews of the measures, the relationship between the capital regulation and market risk in some studied documents is related to the Santos (2001) internal model of market-risk capital requirement on interest rate related instruments and equities in the trading book, the Gallati (2003) model of capital requirement for market risk, credit risk and operational risk in the systematic risk framework, the Alexander et al. (2013; 2015) model of mean-CVaR frontier in the minimum market-risk capital requirement, the Hellwig (2010) commercial bank capital-regulation reformation in the wake of financial crisis of 2007/2009, derived from the change in market prices of the assets held in the high trading book of commercial banks in situation that the capital requirement for market risk is lower than the capital requirement for credit risk. It is a viewpoint of market risk in the extent of bank capital regulation by the central bank which an increase in chatter capital forces commercial banks to control the specific capital requirement for market risk.

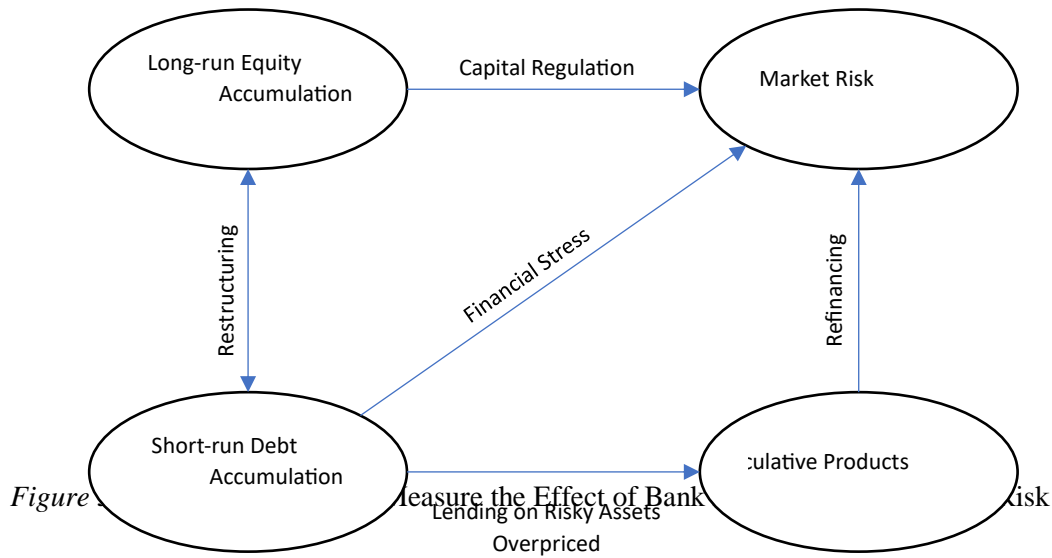
2.3 The Incomplete Measure of the Market Risk Premium in Traditional CAPM

Real cashflows on the market transaction play the role of investment decision making that the effect of the overloaded cashflow demand and/or the overloaded stock supply on internal market risk. However, the incomplete measure of the market risk premium in traditional CAPM is lack of a key factor: debt financial leverage to generate a full picture of internal market risk. Therefore, the market risk premium only explains the prior condition of efficient stock market is positive market risk premium $E(R_m) - R_f > 0$ so that diversified portfolios are located along the slope-up line segment AE of positive market risk premium, or so-called the securities market line (SML) on which the portfolio betas are always positive although the expected market return is negative $E(R_m) - R_f < 0$. This is an absurdity of CAPM to estimate the portfolio beta coefficient. Moreover, the financial meaning of beta coefficient could not be clarified for the real capital asset pricing because of the percentage flat¹ without real weights.

¹ Percentage flat of returns and interest rate is evaluated on one dollar for all the assets in CAPM. For example, expected portfolio return $E(R_i) = 6\%$ on one dollar, expected market return $E(R_m) = 5\%$ on one dollar, regulatory interest rate $R_f = 2\%$ on one dollar, estimated alpha $\hat{a}_i = 1\%$ and beta $\hat{b}_i = 1$; then the CAPM is only a relative equality $E(R_i) - R_f = \hat{a}_i + \hat{b}_i[E(R_m) - R_f]$, resulted as $6\% - 2\% = 1\% + 1 \times [5\% - 2\%]$.

2.4 Proposed Theoretical Structural Model

Based on the analysis framework in the context of this research, the authors suggest the proposed theoretical structural model in four dimensions: (i) Long-run equity accumulation, (ii) Short-run debt accumulation, (iii) Speculative products, and (iv) Market risk. In the four dimensions, the direct and indirect effects of long-run equity accumulation, short-run debt accumulation, and speculative products on the market risk in stock market relies on capital restructure of commercial banks, or so-called the bias to the dimension of the long-run equity accumulation or the dimension of the short-run debt accumulation affecting the market risk in each market cycle or each financial crisis. And the theoretical model is designed under the following structure:



Capital restructure of commercial Banks and the key bias of investment decision making:

Restructuring capital of commercial banks provides the key bias of market risk prediction: long-run equity accumulation or short-run debt accumulation. In condition that the activities of investment and business in the market of commodities and services are stronger than the ones of speculation in stock market, the impact trend of the long-run equity accumulation on the market risk is high; or contrary that the activities of investment and business in the market of commodities and services are weaker than the ones of speculation in stock market, the impart trend of short-run debt accumulation on the market risk is high. This key bias provides the investment decision making for risk management of commercial banks in each market cycle or financial crisis.

3. Research Methodology

In many studied documents, the measure of bank risk-taking is applied by the Z-score to represent the insolvency risk of commercial banks (Laeven & Levine 2009; Houston et al., 2010; Delis et al, 2013; Khan et al., 2017; Monzur Hasan et al., 2020):

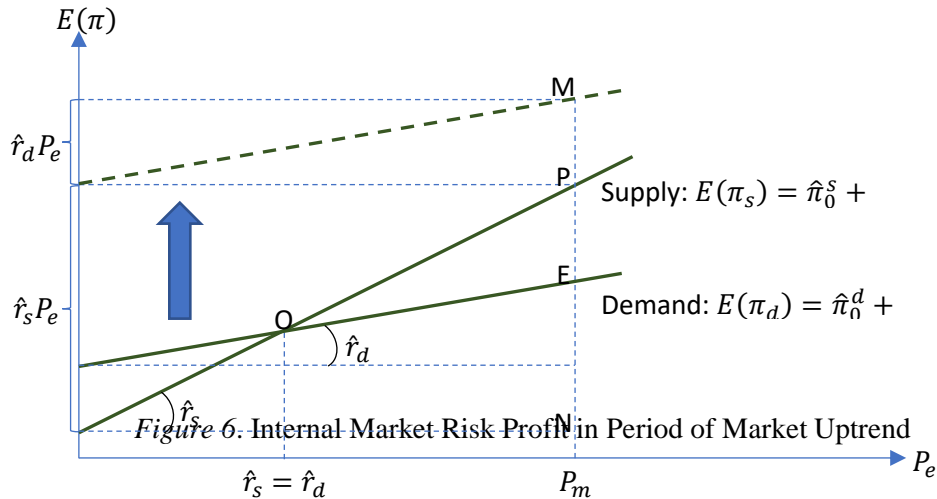
$$Z = \frac{ROA + CAR}{\sigma_{ROA}} = \frac{NI/TA + E/TA}{\sigma_{ROA}}, \quad (6)$$

in which ROA is return on total asset, CAR is ratio of equity E to total asset TA , and σ_{ROA} is standard deviation of ROA . In formula (6), the higher volatility of Z -score reflect the higher insolvency risk of commercial banks. But it is wondered how to connect Z -score with the measure of market risk. Konishi & Yasuda (2004) suggests the linkage between net earnings NI and portfolio profit π of commercial banks from market:

$$\pi = \partial P_B Q_B, \quad (7)$$

where P_B portfolio price of commercial banks, Q_B is the number of outstanding shares, and symbol ∂ is the change. The replacement of portfolio profit π into net earnings NI in formula (6) is not clarified for the measure of market risk, despite providing an alternative measure for Z -score.

3.1 The Measure of Market Risk Profit



It is known that market risk or systematic risk should be laid on the whole profits of all portfolios listed in a stock market which the profits is a function of the equilibrium market price, so-called break-even market price between total benefits of selling stocks and total costs of buying and holding stocks on market transaction. And the determinants of market risk profit are based on two dimensions: the cashflow demand D that investors buy and hold stocks for ownership and the stock supply S that shareholders sell stock for profitability; and then the market risk profit is determined as follows:

$$E(\pi_m) = P_e \times (\hat{r}_s + \hat{r}_d), \quad (8)$$

in which $E(\pi_m)$ is expected market risk profit of whole stock market, P_e is equilibrium market price, \hat{r}_s is speculative market return on stock supply and \hat{r}_d is ownership market return on cashflow demand, shown in Figure 6.

When stochastic market price P_m is greater than the equilibrium market price P_e plus the market risk profit $E(\pi_m)$, $P_m > P_e + E(\pi_m)$; the phenomenon of market risk appears in stock market.

3.2 The Measure of Bank Risk-Taking

It is known that the abnormal accumulative equity of commercial banks in short run usually brings a signal of insolvency risk of commercial banks, in which the accumulative equity includes (i) the net earnings NI on business performance of commercial banks and (ii) issuing equity or increasing charter capital and surplus capital in accordance with the capital regulation of the central bank, but there is only issuing equity relevant to market risk profit. Therefore, the structure of market risk profit is split into portfolio risk profit of commercial banks and portfolio risk profit of the others listed in a stock market:

$$E(\pi_o) = E(\pi_m) + \frac{P_e^b}{P_e - P_e^b} \times [E(\pi_m) - E(\pi_b)], \quad (9)$$

in which $E(\pi_b)$ is portfolio risk profit of commercial banks listed in the stock market with its equilibrium price P_e^b , and $E(\pi_o)$ is portfolio risk profit of the others listed in the stock market. Then, the prior condition of evaluating bank risk-taking is $E(\pi_m) < E(\pi_b)$ when stock market has a signal of market uptrend crash, $P_m > P_e + E(\pi_m)$.

The latter condition of bank risk-taking is based on capital structure and profitability of commercial banks connected with expected portfolio risk return $E(R_b)$ of commercial banks at level of banking system:

$$E(R_b) = \frac{E(\pi_b)}{P_e^b} = \frac{E}{E + D} \times ROE + \frac{D}{E + D} \times R_d, \quad (10)$$

where E is book equity of commercial banks, D is book debt of commercial banks, ROE is return on book equity of commercial banks and R_d is real deposit rate of commercial banks. Testing the bank risk-taking is determined as follows:

$$E \times [ROE - E(R_b)] \geq D \times [E(R_b) - R_d]. \quad (11)$$

The consideration of two key conditions related to the measure of market risk and the measure of bank risk-taking is based capital structure, profitability and expected portfolio return of commercial banks to explain the effect of market risk on bank risk-taking. The key bias of investment decision making relies on the long-run equity accumulation on the left of the equation (11), or the short-run debt accumulation on the right of the equation (11). Then, the selection of the impact trend on the market risk is based on the change in restructuring capital of commercial banks.

4. Conclusion

The research provides a new methodology for a connection between the bank risk-taking in banking system and the market risk in stock market to support the market risk management of commercial banks and the investment performance in stock market. The theoretical model is proposed under the capital structure of commercial banks combined with market risk profit to examine the key bias of the impact trend on the market risk: (i) if the capital structure is biased to the long-run equity accumulation of commercial banks, the impact trend of capital regulation factor or equivalent factors on the market risk is high; or (ii) if the capital structure is biased to the short-run debt accumulation of commercial banks, impact trends of financial stress of deposit funding and lending on assets overpriced on the market risk are high.

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