An Empirical Study of Banking Make Loans, Credit Risk and Corporate Financing Decision

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Abstract: This paper primarily uses accounting data and statistical methods to construct a credit risk models. Due to corporate make use of financial leverage can enhance ROE, this is the first time from bank credit lines audit consider business capital structure, find out the variable that can significantly affect corporate performance in global financial crisis, study of corporate financing decision. That made it be possible to predict in advance the probability of a company experiencing credit risk, reduce bank risk weighted assets and enhance BIS capital adequacy ratios.

Empirical analysis, the author built up a credit risk model using K-S test, M-U test, Pearson test and Logistic regression model. Focusing on exchange-listed from Taiwan that experienced credit risk during a sampling period covering the years 2000-2008, carrying out matched-pair analysis on 133 companies, selecting 133 pairs, each consisting of one credit risk company and one non-credit risk company that are similar in size and operating in the same industry (Beaver, 1966). Finding, In the case when debt ratio >50%, that can significantly affect corporate performance in terms of the financial structure, solvency, operating performance, profitability, cash flow and corporate governance. Adjust financing decision, increase liquid liabilities and long-term funds adequacy ratio, improving financial structure. Empirical results suggest that avoiding switch of CPAs (outsider), establishment of independent directors and supervisors (insider) in order to enhance corporate governance power. Implications, a major part of financial institutions must follow to minimize credit risk and make successful loans could reduce risky asset and enhance BIS ratio.

Keywords: Capital Structure, Financing Decision, Risky Asset, BIS Ratio

1. Introduction

Managing financial institutions has never been an easy task, but in recent years it has become even more difficult because of greater uncertainty in the economic environment. The U.S. subprime mortgage crisis attacked the word in March, 2007. Touch off the global financial crisis, South Europe occurred debt crisis in 2010, trigger European Union sovereign risk in 2011 to 2012. A major part of the business of financial institutions, such as banks is making loans. In order for these institutions to earn high profits and business performance, that financial institution managers has screening and monitoring being adverse selection and moral hazard, make the U.S. real estate market crashed, as a result of greater interest-rate fluctuations and
defaults by borrowers increasing credit risk. The standard & poor’s corporation drop the U.S. debt rating, the global stock market crashed in August, 2011. Observe credit rating agency drop the country debt rating, influential for investor or investment in enterprise, especially resulting in substantial fluctuations in the stock market inscrutability. Managing business also has never been on easy task. In this paper examine how managers of financial institutions or business, these managers must follow to minimize credit risk and make successful loans reduce the risky asset in the banks, as well as credit risk management and financial forecasting.

The purpose of this study is to use accounting data and Logistic regression to construct a credit risk model following Yu, Zhang and Huang (2011). This is the first time from bank credit lines audit consider business capital structure, which the debt ratio >50%, find out the variable that can significantly affect corporate performance in the global financial crisis 2000-2008. Focusing on exchange-listed stock companies from Taiwan that experienced credit risk, counts back from the time companies entered into distress, to one year prior, two years prior, and three years prior. Carry out 1:1 matched-pair sampling using Beaver (1966) analysis on 266 companies, to perform normality K-S test, M-U test, Pearson test and logistic regression. That made it be possible to predict in advance the probability of a company experiencing credit risk, reduce bank risk weighted assets and enhance BIS capital adequacy ratios. Result of this study, the credit risk model has significant predictive power and is thus effective in predicting distress. Predictive accuracy for credit risk enterprises is more than 95.79%, with accuracy readings of 97.39% one year prior to the occurrence distress, 97.96% at two years prior, and 95.79% at three years prior.

2. Literature Review

In 1996, Bank of International Settlements (BIS) definition credit risk is counter party especial in defaults by borrowers, leading to large losses of another party. Yu, Zhang and Huang (2011) had defined counter party default or drop the credit rating, leading to potential losses risk. Credit risk exposure in loans, bond, and derivatives, occur in asymmetry information or the company lack of measure credit risk capability. Therefore, process of trading difficult to judge counter party default probability, undisciplined way of credit culture develop in intra-organization, cause credit risk awareness weak, credit risk control technology and procedure is not too familiar, increase credit risk in trading.

Measuring asset credit risk should be realize event of default, which effect asset value possibility of distribution, include probability of default, loss given default, and exposure at default. Since corporate environment tends to vary constantly, different financial variables should be used, furthermore, results from forecasting model would vary because of the use of financial reports of different period. As a result, the authors included corporate size and earning stability these two variables into the Z-value model to slightly adjust the re-constructed new model (Altman et al.1977). Hence, several scholar, including Deakin (1972), Chen (1983), Chen, Wang & Yu (2004), Lin, Yu, Qi & Chen (2009), Yu and Liang (2011), Chung (2011), Yu, Zhang & Huang (2011), Lin & Pan (2011), Yu, Cheng, Feng & Li (2011), and Yu & Tsai (2012) all adopted Altman’s suggestion in their studies.
Using accounting data to construct a credit risk models in family firms, Wu, Yu, Chen & Lin (2011) pointed out that the CEOs of family firms should value opinions from outsiders CPA audits and outsider monitoring in order to reduce agency problems and elevate corporate governance power and corporate value. Yu, Chen, Feng & Li (2011) implications is that the non-groups companies pay attention to corporate governance could reduce the probability of credit risk. At present business loans in banks and credit rating agency, had a lot of measure credit risk model, as well as the academia and practice. Such as discussed corporate governance and credit risk (Lin, Yu, Qi & Chen, 2009), credit risk, inter-bank, and financial liquidity risk on system risk quantitative model in Taiwan (Chung, 2011), a study of business financial credit risk assessment model (Lin & Pan, 2011).

Observe corporate financial crisis early-warning model, when a company experiences issuing non-sufficient fund (NSF) checks, panic withdrawal, be trapped in financial risk. An occurrence of any one of the above condition is regarded as a failure (Beaver, 1966). This study adopted the definition from Article 49, 49-1, 50, and 50-1 stated in TSE Operational Rules, as well as the financial crisis verification events provided by Taiwan Economic Journal (TEJ). Lieu, Lin and Yu (2008), Zhuo (2008), Wu, Yu & Huang (2010), indicated that run on banks, bankruptcy, receiving a qualified opinion from CPAs, undergoing corporation reorganization, seeking for bail-out, becoming a full-cash delivery stock or delisted, having the book value per share under five dollars or a negative net worth. This study definition of corporate credit risk is given by Yu, Zhang and Huang (2011), when company occur financial crisis regard as credit risk.

3. Methodology

Empirical analysis, the author built up a credit risk model using K-S test, M-U test, Pearson test and Logistic regression model. Focusing on exchange-listed from Taiwan that experienced credit risk during a sampling period covering the years 2000-2008, carrying out matched-pair analysis on 133 companies, selecting 133 pairs, each consisting of one credit risk company and one non-credit risk company that are similar in size and operating in the same industry (Beaver, 1966). The present study is following Yu & Wang (2011), using the Pearson correlation coefficients of independent variables and eliminates highly correlated variables. Stepwise Multiple Regression is according to explanatory power of the variables, step by step view independent variable impact, select significantly variable processing is backward. Which is the equation as shown in its.

\[ y = \begin{cases} 
1, & \text{if } (Y_i^* > 0) \\
0, & \text{if } (Y_i^* < 0) 
\end{cases} 
\]

(1)

\[ Y_i = \alpha + \beta X_i + \gamma D_i + \Sigma i, \quad y = \begin{cases} 
1, & \text{if } (Y_i^* > 0) \\
0, & \text{if } (Y_i^* < 0) 
\end{cases} 
\]

y : The variable is actual observed, \( y=1 \) for the occurrence of credit risk : \( y=0 \) for no occurrence of credit risk.
In which \( P_i^1 = \frac{1}{1 + e^{-Z_i}} \)

(2)
Its probability value is between zero and one, which after the linear transformation is referred to as Logit.

\[ P_i^1 = P(Y = 1) = \frac{1}{1 + e^{-X_i, \beta}} = \frac{1}{1 + e^{-Z_i}} = \frac{e^{Z_i}}{1 + e^{Z_i}} \]

(3)

After the linear transformation Logit model is \( P_i^1 = \frac{e^{Z_i}}{1 + e^{Z_i}} \)

(4)

\( p_i^1 \) The probability of \( i^{th} \) company which occurred credit risk

\( p_i^0 \) The probability of \( i^{th} \) company which was not occurrence of credit risk

\( a_i \) The intercept

\( \beta_{k,i} \) The rector(\( i \times k \)) of the regression coefficient

\( \beta_{k,i} \) The vector(\( i \times k \)) of the independent variable of the \( i^{th} \) company

\[ P_i^0 = P(Y = 0) = 1 - P(Y = 1) = 1 - P_i^1 \]

(5)

4. Result and Analysis

Results presented in Table 1 suggested that the Logistic credit risk model built for predicting company occurrence of credit risk had more than 95.79%, when debt ratio >50%, had 97.39%, 97.96%, and 95.79% predicting precision rate on the one-year, two-year, and three-year periods before the occurrence of credit risk. As a result, this established credit risk model is acceptable and effective.
4.1 Logistic regression analysis at one year prior to occurrence of credit risk:

\[ Y_i = -3.551 - 0.019X_6 + 0.181X_{16} + 7.489X_{29} + 4.698X_{31} \]  
(6)

Results from the test of significance on explanatory variables suggested that the times interest earned \( (X_6) \), operating expense ratio \( (X_{16}) \), switch of CPAs \( (X_{29}) \) and establishment of independent directors and supervisors \( (X_{31}) \) had passed the test and its sign was expected. Presented in Table 1 one year prior, empirical result suggested that a negative\((-\) estimated value of the \( \beta \) regression coefficient of the times interest earned is an indication that the higher the times interest earned of the company, and as a result, the credit risk probability of the company is reduced. That the estimated value of the \( \beta \) regression coefficient of the operating expense ratio, switch of CPAs and establishment of independent directors and supervisors was positive\(+(+)\), which suggested that an increase of the operating expense ratio, switch of CPAs and had no establishment of independent directors and supervisors, that will increase the credit risk probability of the company.

4.2 Logistic regression analysis at two years prior to occurrence of credit risk:

\[ Y_i = -8.838 - 0.001X_2 + 0.081X_{25} + 6.713X_{29} + 5.307X_{31} \]  
(7)

Results from using the test of significance on explanatory variables revealed that the long term funds adequacy ratio \( (X_2) \), switch of CPAs \( (X_{29}) \) and establishment of independent directors and supervisors \( (X_{31}) \) had passed the test and its sign was expected, whereas the sign of retention ratio \( (X_{25}) \) failed the expectation. Presented in Table 1 two year prior, empirical result indicated that the estimated value of the \( \beta \) regression coefficient of long term funds adequacy ratio was negative\((-)\), which suggested that an increase of the long term funds adequacy ratio will reduce the credit risk probability of the company. That the estimated value of the \( \beta \) regression coefficient of retention ratio, switch of CPAs, and establishment of independent directors and supervisors was positive\(+(+)\), which suggested that an increase of the retention ratio, switch of CPAs and had no establishment of independent directors and supervisors, that will increase the credit risk probability of the company. Generally, the retention ratio is that earning after distribution/net profit after tax of the company, the higher retention ratio of the company, and as a result, will increase savings and stable of the company. Here are some significant, at two year prior to occurrence of credit risk, adjusting financing decision-making of the company, viewing long-term funds and fixed assets on account of financial security, the fixed assets weather deal with long-term funds or not. Therefore, adequately reducing the retention ratio and enhancing the long term funds adequacy ratio improve financial structure of the company, avoiding switch of CPAs and establishment of independent directors and supervisors, then the corporate governance can be improved, which make great efforts among the issue of the company.
4.3 Logistic regression analysis at three years prior to occurrence of credit risk:

\[ Y_i = -20.423 + 0.081X_{13} + 0.198X_{25} + 0.111X_{26} + 23.316X_{29} + 9.050X_{31} \]  

(8)

Results from using the test of significance on explanatory variables revealed that switch of CPAs (X_{29}) and establishment of independent directors and supervisors (X_{31}) had passed the test and its sign was expected, whereas the sign of cash flow adequacy ratio(X_{13}), retention ratio(X_{25}) and cash flow ratio(X_{26}) failed the expectation. Presented in Table 1 three year prior, empirical result indicated that the estimated value of the \( \beta \) regression coefficient of cash flow adequacy ratio, retention ratio, cash flow ratio, switch of CPAs, and establishment of independent directors and supervisors was positive(+), which suggested that an reduce of the cash flow adequacy ratio, retention ratio, cash flow ratio, avoiding switch of CPAs, and establishment of independent directors and supervisors, that will reduce the credit risk probability of the company. Generally, the higher of cash flow adequacy ratio, retention ratio and cash flow ratio, the better of the company. Here are some significant, at three year prior to occurrence of credit risk, adjusting short-term financing decision-making of the company, which can increase liquidity debt. Therefore, adequately reducing the cash flow adequacy ratio, retention ratio and cash flow ratio, which make great efforts on the other issue of the company.

Empirical findings suggested that when debt ratio>50%, that the times interest earned (X_6), operating expense ratio (X_{16}), switch of CPAs (X_{29}) and establishment of independent directors and supervisors (X_{31}) in the one year prior, the long term funds adequacy ratio(X_2), retention ratio(X_{25}), switch of CPAs (X_{29}) and establishment of independent directors and supervisors (X_{31}) in the two years prior, cash flow adequacy ratio(X_{13}), retention ratio(X_{25}), cash flow ratio(X_{26}), switch of CPAs (X_{29}) and establishment of independent directors and supervisors (X_{31}) in the three years prior ahead of the occurrence of credit risk of a company. What is worth noticing is that switch of CPAs, establishment of independent directors and supervisors during the one year prior, two years prior and three years prior, the estimated value of the \( \beta \) regression coefficient was positive(+). retention ratio during the two years prior and three years prior, the estimated value of the \( \beta \) regression coefficient was positive(+). Therefore, adequately reducing the retention ratio, avoiding switch of CPAs and establishment of independent directors and supervisors, then the corporate governance can be improved, that is an important task for minimizing the credit risk probability.

5. Conclusion and Suggestion

Empirical results suggested that when debt ratio>50%, that can significantly affect corporate performance in terms of the financial structure, solvency, operating performance, profitability, cash flow and corporate governance. Adjust financing decision, increase liquid liabilities and long-term funds adequacy ratio, improving financial structure. Empirical results suggest that avoiding switch of CPAs (outsider), establishment of independent directors and supervisors (insider) in order to enhance corporate governance power. Implications, a major part of financial institutions must follow to minimize credit risk and make successful loans could reduce risky asset and enhance BIS ratio.
The conclusion is: A. Accounting data variables had an abnormal distribution; B. A significant variation was found between credit risky company and normal company; C. Accounting data passing the credit risk model; D. Logistic credit risk model is an effective tool for financial forecasting; E. Adjust financing decision, increase liquid liabilities and long-term funds adequacy ratio, improving financial structure. These accounting data can be used as referencing indicators for decision making and strategic analysis, and financial institutions must follow to minimize credit risk and make successful loans could reduce risky asset and enhance BIS ratio.

References


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