

Executive Summary

Problem

This study investigates whether balance sheet and income statement measures of commercial and savings banks can be used as predictors of their failures. Detecting banks in distress is particularly important for regulators due to the serious and costly consequences of bank failures for the whole economy. First research work addressing this question goes back to the early 1930s. Later, the seminal publications by Beaver (1966) and Altman (1968) marked the beginning of the modern field of bankruptcy prediction. Many researchers searched for better explaining financial and non-financial variables as well as better performing statistical methods in subsequent studies. Up to today, however, neither a superior statistical method nor an obviously outstanding set of explanatory variables have been found yet.

Method

This paper is split into four parts. The first chapter gives a literature review of earlier studies in the field of bankruptcy prediction of corporations and banks in particular. The second chapter explains the methodology of the study in detail. The investigation is based on financial data of all U.S. commercial banks and savings institutions insured by the Federal Deposit Insurance Corporation (FDIC) between January 1, 2001 and December 31, 2012. During this period, 414 commercial banks and 76 savings institutions were closed and the FDIC was appointed as receiver. Furthermore, we introduce the 25 examined financial ratios which cover measures for asset quality, capital structure, efficiency, liquidity, payout, profitability, and turnover. They are calculated for all 147'446 observations of failed and non-failed institutions. Variables measuring growth rates, economic conditions, or market information are not used. The third chapter provides descriptive statistics in two ways: for each year and for the last five annual reports prior to bankruptcy. The final part of the thesis examines the predictive power of these ratios applying univariate and multivariate analysis. Univariate analysis includes logistic regression and analysis of variance. Multivariate analysis focuses on discriminant analysis and logistic regression because of the dichotomous nature of failure. For that, each failed bank is matched with a randomly selected non-failed bank. The analysis identifies the relative importance of the ratios. In addition, we calculate the optimal weighted combination of ratios to distinguish between surviving and failing banks. Holdout samples are used in order to validate the measured accuracy rates.

Results

Descriptive statistics show that financial ratios can distinguish between failing and surviving banks. On average, ratios of failing banks are worse affected than those of surviving banks, especially in periods characterized by low GDP growth rates. In general, the medians of the examined variables differ between failing and non-failing institutions in four different

ways. The medians can be equal, dichotomous, converging, or diverging in the years before failure. Hence, the examined variables are not equally well suited to detect failing banks. Based on univariate logistic regression, the risk based capital ratio shows with 89.8% of correctly classified observations one annual report before failure the highest accuracy. In the long term, only the working capital to total assets ratio and cash dividends ratios exhibit error rates below 40% for all five annual reports before failure. We are not able to detect bankruptcy with other examined variables more than two reports in advance when they are considered individually. Analysis of variance indicates that the reasons for failure change over time, because some variables perform well during particular years, whereas in others, they are not statistically significant.

Multivariate logistic regression and discriminant analysis allow us to combine multiple variables. Re-estimating Altman's five variables model, we are able to classify 92.4% of the observations to the right group one annual report prior to bankruptcy. Additionally, we determine a model composed of eight ratios based on a stepwise variable selection procedure. The model improves the prediction accuracy to 93.3%. It consists of the following variables: Retained earnings, noncurrent assets, working capital, total income (all to total assets), tier 1 capital, net income, noninterest income (all to average total assets), and the share of noninterest expense to the sum of net interest and noninterest income (efficiency ratio).

Regardless of the underlying method, multivariate models are unsuitable to detect failing banks more than three annual reports in advance. Not surprisingly, the error rates are constantly rising as the time to failure increases. Obviously, the error rates are mainly attributable to type I errors, whereas type II errors rise only moderately. In general, we observe a superior classification accuracy of the logistic regression compared to discriminant analysis in the last two periods before failure. In the long term, however, the application of single ratios and discriminant analysis may be preferable.

Evaluation

Our observations are in line with earlier studies and show that accounting ratios exhibit high accuracy rates in detecting failing banks in the last periods before bankruptcy. Hence, most of the failures of the examined financial institutions are attributable to financial reasons because their accounting ratios deteriorate over time. However, low long term accuracy rates reveal the limits of financial ratios as predictors of bank default. In addition, the observed accuracy rates are based on ex post classifications which may overestimate the abilities to predict future failures. It should be noted that financial ratios should only be considered together with additional factors (which are not examined in this study) to get a comprehensive picture of the actual default probability of a financial institution. Such factors could include measures for risk exposures or GDP growth rates.