Predicting large US commercial bank failures

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Abstract

The present study applies empirical methods to the problem of predicting large US commercial bank failures. Due to sampling limitations, scant research has examined the feasibility of using computer-based early warning systems (EWSs) to identify pending large bank failures. In the late 1980s and early 1990s numerous large banks failed in the US enabling us to collect adequate samples of large banks with more than $250 million in assets for empirical analyses. Both the parametric method of logit analysis and the nonparametric approach of trait recognition are employed to (1) develop classification EWS models based on original samples and (2) test the efficacy of these models based on their prediction accuracy using holdout samples. Both logit and trait recognition performed well in terms of classification results. However, with regard to the prediction results using holdout samples, trait recognition outperformed logit in most tests in terms of minimizing Type I and II errors. Other results from the trait recognition models reveal that complex two- and three-variable interactions between financial and accounting variables contain additional information about bank risk not found in the individual variables themselves. We conclude that computer-based EWSs can provide valuable information about the future viability of large banks.

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1. Introduction

Seminal work by Beaver (1966) and Altman (1968) introduced computer-based models using accounting information to predict firm failure and sparked a continuing stream of research in the corporate financial literature (e.g., see Beaver, 1968; Edmister, 1972; Blum, 1974; Altman, Haldeman, & Narayanan, 1977; Martin, 1977; Ohlson, 1980; Zavgren, 1985; Jones, 1987; Keasey & McGuinnes, 1990; Platt & Platt, 1990; Altman, 1993; Coats & Fant, 1993; Altman, Marco, & Varetto, 1994; Altman & Narayanan, 1997, and others). One of the most important extensions of this literature is in the area of banking. Bank regulators are keenly interested in developing early warning systems (EWSs) to supplement information obtained from on-site examinations and, in turn, help predict impending bank failures. By doing so, regulatory intervention may prevent a bank failure or reduce the costs of failure. Extensive research on failed banks has confirmed that computer-based models perform well as EWSs (e.g., see Meyer & Pifer, 1970; Stuhr & Van Wicklen, 1974; Sinkey, 1975; Santomero & Vinso, 1977; Bovenzi, Marino, & McFadden, 1983; Korobrow & Stuhr, 1985; West, 1985; Maddala, 1986; Lane, Looney, & Wansley, 1986; Whalen & Thomson, 1988; Espahbodi, 1991; Thomson, 1991; Kolari, Caputo, & Wagner, 1996, and others).

A major issue confronting bank regulators, analysts, and others is the prediction of large bank failure. In this regard, the on-going consolidation movement in the banking industry is creating an increasing number of large banks (see Berger, Kashyap, & Scalise, 1995; Boyd & Graham, 1996). The growing numbers and size of large institutions raise new policy challenges for regulatory and government entities charged with the responsibility of ensuring the safety and soundness and smooth functioning of the banking system. One policy response to the potential for too-big-to-fail (TBTF) dangers (including competitive inequalities, moral hazard problems, and inefficiency) is to increase bank regulation of large institutions (see Hoenig, 1999). While the development of computer-based EWSs for large banks is consistent with this regulatory policy, scant research exists on this topic due to inadequate sample sizes for research purposes. Previous work on anticipating large bank failures has focused on the usefulness of stock price data as a bank-specific EWS (e.g., see Pettway, 1976, 1980; Peavy & Hempel, 1988), in addition to financial ratio profiles of individual case studies of large banks prior to failure (e.g., see Sinkey, 1985; Federal Deposit Insurance Corporation, 1997). To our knowledge no previous studies in banking examine EWSs for large bank failures developed from publicly available accounting and financial data, despite their obvious importance to bank regulatory practice and market participants.

In the late 1980s and early 1990s a surge of bank failures occurred in the United States due to regional economic difficulties. Focusing on the 1989–1992 period, and defining large banks to be greater than $250 million in total assets, we are able to collect a sample of 55 (60) large failed banks with data available up to (2) years prior to failure in this period as well as over 1,000 nonfailed large banks in each year. Although our large bank failure samples are substantial by historical standards, they are quite small in terms of minimum sampling requirements in most EWS models. It is common practice to split the sample of failed banks into (1) an original sample used to build a classification model and (2) a holdout sample reserved for prediction purposes to determine EWS model efficacy. In the present paper we use 18 large failed banks in 1989 and all other large banks in the US in that year to build the classification models, and
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