# Predicting Bankruptcies Using Rough Set Approach: The Case of Turkish Banks

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*Abstract:* - Evaluation of the reasons for business failures has been a major preoccupation of researchers and practitioners for many years. A large number of methods including multiple regression analysis, discriminant analysis, logit analysis, recursive partitioning algorithm, and several other techniques have been used for the prediction of business failures. This study has followed a different approach using the Rough Set theory to investigate the reasons of bankruptcies in the Turkish banking system. For this purpose, financial ratios of 29-41 commercial banks were examined for the 1995-2007 period. The results showed that this model is a promising alternative to the conventional methods for bankruptcy prediction.

*Key-Words:* - Bankruptcy prediction, Financial ratios, Rough Set Theory, Classification

## 1 Introduction

Business failure, according to a widespread definition, is the situation that a firm cannot pay lenders, preferred stock shareholders, suppliers, and hence goes into bankrupt according to the law. The number of failing firms is an important indicator of the health of the economy [1]. The high individual and social costs encountered in corporate bankruptcies make this decision problem very important to parties such as auditors, management, government policy makers, and investors. Bankruptcy is a worldwide problem and the number of bankruptcies can be considered an index of the robustness of individual country's economy [2]. The bankruptcy literature reveals a high number of bankruptcy prediction models. They are generally based on financial symptoms [3,.4, 5, 6]. Over the last 35 years, academic researchers from all over the world have dedicated their time to the search for the best corporate failure prediction model that can classify companies according to their financial health or failure risk [7, 8, 9]. There have been several previous proposals that applied operational research techniques and pattern recognition methods to predict business failure [10, 11, 12]. Methods such as discriminant analysis, logit analysis, recursive partitioning algorithm, and several others have been used in the past for the prediction of business failure. Although

some of these methods led to models with a satisfactory ability to discriminate between healthy and potentially risky (candidates for bankruptcy) businesses, they suffer from some limitations, often due to the unrealistic assumption of statistical hypotheses or due to a confusing language of communication with the decision makers [5]. In this paper, the Rough Set (RS) approach is used to provide a set of rules that are able to discriminate between healthy and failing banks in order to predict bank failures.

Rough Set Theory (RST) was introduced by Pawlak [13]. The RS philosophy is based on the assumption that with every object of the universe there is associated a certain amount of information expressed by means of some attributes used for object description. Objects having the same description are indiscernible with respect to the available information. The indiscernibility relation thus generated constitutes a mathematical basis of the RST; it induces a partition of the universe into blocks of indiscernible objects, called elementary sets that can be used to build knowledge about a real or abstract world. The use of the indiscernibility relationship results in information granulation [14]. There are many potential applications in different fields [15]. In pharmacology, the analysis of relationships between the chemical structure and the antimicrobial activity of drugs [16] has been successfully investigated. Banking applications include