Chapter 23
Genetic Algorithms for Small Enterprises Default Prediction: Empirical Evidence from Italy

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ABSTRACT

Company default prediction is a widely studied topic as it has a significant impact on banks and firms. Moreover, nowadays, due to the global financial crisis, there is a need to use even more advanced methods (such as soft computing techniques) which can pick up the signs of financial distress on time to evaluate firms (especially small firms). Thus, the author proposes a Genetic Algorithms (GA) approach (a soft computing technique) and shows how GAs can contribute to small enterprise default prediction modeling. The author applied GAs to a sample of 6,200 Italian small enterprises three years and also one year prior to bankruptcy. Subsequently, a multiple discriminant analysis and a logistic regression (the two main traditional techniques in default prediction modeling) were used to benchmarking GAs. The author's results show that the best prediction results were obtained when using GAs.

INTRODUCTION

Bankruptcy prediction has been extensively studied since the late 1960s (Altman, 1968, 1993, 2004; Altman et al., 2005; Altman & Sabato, 2005; Beaver, 1967, 1968; Berger, 2006; Berger & Frame, 2007; Blum, 1974). Analysis of the financial position of the firms is very useful for both the firms and banks alike, such a task is used for credit risk assessment and to maintain the stability of financial markets and general economic prosperity. The numbers of defaulting firms is, in fact, an important issue for the economy of every country and it can be considered as an index of the development and robustness of the economy of a country (Zopounidis & Dimitras, 1998). Entrepreneurs, employees and labor organizations, policy makers, industry participants, investors, creditors, auditors, shareholders, banks are all interested in bankruptcy prediction because it affects all of them alike (Etemadi et al., 2009; O'Leary, 1998; Ravi et al., 2008). Therefore, timely identification of firms' impending failure is highly desirable (Jones, 1987).

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Prediction models may be used by the shareholders in choosing between the opportunities open to them (i.e. divestment of the company, merging with, or takeover by other companies). If the results are not satisfactory, then shareholders can choose the option to sell out the company at a price over real value, because the company still has a bargaining power to be sold over real value. If shareholders wait in the hope of restructuring the company they may face substantially low market values (Aktan, 2011). Moreover, company default prediction models can be considered by firm operating in a district or in a cluster. Since, failure of a such firm would ruin the reputation of the entire district and will affect investment decisions and credit decisions; therefore, the other firms in the district can monitor what is going on through estimation tools and of course can takeover other distressed firms that would be beneficial for them.

Labor organizations can use default prediction models to reveal information about the financial health of the company, from which they can define the pay rise and insist on other labor rights (Aktan, 2011). Moreover, employees of financially distressed predicted company can work harder to recover the company or seek another job for themselves.

Investors could utilize prediction models to maximize their investment decisions. In fact, an investor may not have enough time for and information in evaluation of investment tools. In such a situation, wrong decisions would be taken according to poor foresight and therefore the expected return on investment cannot be achieved. Failure prediction models help the investors providing necessary time an investor needs and resolving the experience/information deficits. With the help of the prediction tools, investors can identify the poor stock in their portfolios and take actions to sell them before these stocks' value evaporate. According to Aktan (2011) "an investor can reshape his portfolio by prediction tools, i.e. if the financially distressed company is expected to recover from its problems, then investing on this company's low priced stocks can bring high returns later, when the company resolves. Thus, investors achieve their objectives by investing in the right areas, and companies have the opportunity to be strong by rational distribution of funds. Resolution of difficulties in funding lets the opportunities for new investments and provides companies to obtain competitive advantages".

Banks will incur a lost of profit due to the lack of the payback of capital loaned to the firm and, in a long range, they could enter themselves in a dangerous zone if, over a medium/long term, many firms will not payback their loans. Companies will have even more difficulties to access credit and, probably, they will not be able to pay all their stakeholders (i.e. suppliers, employees). Consequently, other firms (i.e. supplier firms) will be hit by the crisis, the employees will be laid off, and unemployment will grow. This will lead to a general deterioration of the economic and social stability and prosperity of the country. Therefore, with the help of a company default prediction model, banks benefit from choosing the right company to loan. Evaluation of loan applications by this model provides more successful and faster results and help banks to reject loan application of a company which is predicted as financially distressed by the model, saving time and funds. Therefore, funds will be used in the right areas and, in this case, the country's economy and the credit institutes can gain great benefits.

These high individual and social costs, incurred in corporate bankruptcies, have driven many authors (Altman, 1968, 1993; Beaver, 1967, 1968; Berger, 2006; Berger & Frame, 2007; Blum, 1974; Martin, 1977; Ohlson, 1980; Odom & Sharda, 1990) towards a better understanding and prediction capability. However, these studies mainly focus on medium and large enterprises which systematically produce detailed financial information, whilst only a small number of authors (Altman & Sabato, 2005; Behr & Güttler, 2007; Carter & Van Auken, 2006; Edmister, 1972; Pompe & Bilderbeek, 2005; Saurina &