

Title of doctoral dissertation: Evaluation of long-term trajectories for Colombian businesses based on statistical models of firm's bankruptcy prediction

The Author of the doctoral dissertation: mgr inż. Jackson Arroyave

Summary of the doctoral dissertation in English:

When research on failure prediction started during the second half of the last century, there were no cutting-edge statistical methods or laptops accessible for the researchers. Financial ratios values of distressed and non-distressed companies were weighed against each other. It was not until the eighties of the last century, that discriminant analysis was the leading methodology for bankruptcy forecasting. Nevertheless, discriminant analysis was affected by assumptions that were disrupted frequently. There was a need for theoretically well-structured models in default prediction. Adding to this, the vast majority of forecasting models are not sufficiently accurate to predict firms' failure beyond a couple of years, and its predicting power diminishes rapidly as the time frame extends.

In this dissertation, the author investigates how the trajectories of firm financial conditions over a period of time can be developed and can prolong the effectiveness used to predict business bankruptcy. This is the first study to evaluate failure trajectories for Colombian firms' prediction modelling and one of the first in the general world literature, as world literature is lacking such research about trajectories. Therefore, the main objective is to develop long-term trajectories with the use of seven common statistical models that in the literature are characterised by high effectiveness and additionally, with two own models estimated by the author specialised to Colombian companies and to verify their influence on the increase of effectiveness on the long forecasting horizon.

Discriminant analysis and logit methodologies and an extensive compilation of financial data are employed to present and characterise the firm's financial trajectories to bankruptcy. This study determines the applicability of these techniques on Colombian firms extending the forecast period to 15 years. To conduct these objectives the author collected the data and calculated the financial ratios from 26770 Colombian companies, of which 2333 were failed companies and the other 24437 non-failed companies, from diverse sectors such as farming, manufacturing, trade, services, construction, and mining for the period 2000 to 2015. Similar assets and liabilities were used to pair the failed and non-failed firms. Companies with undetermined or inaccurate data financial ratios were eliminated, generating a total of 280 firms for the analysis sample, including 140 financially failed firms paired by assets with the same amount of non-failed firms. The learning sample comprises 70 non-failed and 70 failed firms, and the test sample includes 70 non-failed firms and 70 failed firms. The author introduced 40 financial ratios to SPSS, and the software estimated a model with fourteen ratios and a model with three ratios which are highly correlated with information if the company is bankrupt or healthy, and present low correlation to each other.

Firstly, this dissertation has demonstrated that trajectories can be developed and used to increase the effectiveness of forecasting the failure of Colombian firms, and secondly, these trajectories can be used to evaluate the evolution of a deterioration of the financial health of Colombian firms. Thirdly, the designed trajectories yield higher accuracy than those obtained by using other common statistical models, and fourthly, the evolution of the representative trajectories of the development of failed firms contrasted with the evolution of non-failed firms.

The findings of this dissertation should be used by firms and financial institutions to assess and analyse the financial strength of firms in the Colombian market, in such a way that long-term trajectories for non-failed firms may be one of the factors to categorise a firm as sound and healthy, with huge advantages as access to financial markets, higher credit rating, open valuable credit lines and quick acceptance of loans. Business-to-business transactions may be quickened as well, with the use of this methodology, as a base factor for selecting a lasting partnership with other companies.

This dissertation is structured in an introduction, four chapters and conclusions. The first chapter reviews the literature offering insight into the previous theoretical and empirical findings concerning corporate failure and bankruptcy. Chapter 2 characterises the theoretical framework of the models which are conventionally used in the literature to forecast a firm's bankruptcy. Variables used in forecasting models are reviewed in the third chapter. In chapter 4, the methodology, the financial variables used and their selection are discussed. The effectiveness of forecasting models is verified. Long-term trajectories are developed and then investigated. Finally, implications for the bankruptcy prediction domain are discussed and the most important findings of the dissertation are summarised, closing with the conclusion including limitations and future research directions.

Keywords: bankruptcy prediction, bankruptcy risk, corporate failure, classification, trajectories, effectiveness, financial ratios, Colombian firms, discriminant analysis, logistic regression, models.