ASSESSING POTENTIAL FINANCIAL PROBLEMS FOR FIRMS IN BRAZIL

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Abstract. This paper examines the recent business failure experience in Brazil and develops, tests, and analyzes a quantitative model for classifying and predicting serious financial problems of companies. It utilizes a bankruptcy classification model developed by Altman (1968) in order to classify Brazilian firms during the period, 1973 to 1976. A sample of 23 serious-problem firms is compared with a slightly larger control sample of healthy firms. A four-variable model successfully classified 88 percent of the firms one year prior to serious problems and as much as 78 percent three years prior. The importance of models that highlight financial problems early enough to suggest remedial changes is apparent in Brazil. For example, an equilibrium situation between the domestic private sector, multinationals, and public-owned firms is more likely to continue if weaker domestic firms can be helped and preserved. The application of such models by financial institutions and for financial market analysis is comparable to that in the United States and other developed countries. Finally, the paper explores the application of such models in developing countries.

The life-cycle of a business entity usually includes periods of financial difficulties and stress. At the extreme, a firm's financial difficulties may lead to bankruptcy and result either in the liquidation of its assets or in reorganization. Less extreme, but still quite serious, are various financial arrangements possible outside of the jurisdiction of the bankruptcy courts that permit continuity of the firm's operations and the satisfaction of the claims of creditors. These problems are not the sole province of developed countries and can result in relatively more serious problems for the so-called less developed economic environments.

Brazil is an example of an economy where the end-result of a series of economic setbacks could result in severe pressure on private enterprises; tightening of credit for all firms—especially smaller ones—jeopardizing financial institutions; and undermining government efforts to promote economic development. Most observers would agree that preventive action to detect and avoid critical pressures of this type is highly desirable.

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The purpose of this paper is to examine the recent business failure experience in Brazil and to develop, test, and analyze a quantitative model for classifying and predicting serious financial problems of companies.

In an economic system where firms can enter and exit without artificial barriers, the negative economic phenomenon known as failure is quite normal and can have a cleansing effect on society and the economy [Schumpeter 1939]. Even in systems where there is a great deal of governmental influence on the market system, periodic business failures are nothing to be seriously concerned about. All industrialized countries of the world experience these occurrences and usually have fairly elaborate laws to govern the liquidation or reorganization of the failed entity. Of course, to the individuals involved—that is, owners, creditors, managers, employees, and customers—serious-problem situations can be traumatic events. The accurate prediction of these events has obvious benefits, especially if prediction can be made early enough to take corrective action. The situation becomes more serious when the number of failures increases to the epidemic stage and the entire system or subsystem—for example, a particular industry—is jeopardized. This situation is perhaps more likely to occur in a developing country which has not yet formed a large enough core of solid private firms that are sufficiently strong to withstand a sustained period of economic hardship.

The subject of failure prediction has attained international interest and statistical models have been developed in many countries of the world, primarily in developed industrial ones. We know of several efforts in the United States (noted later), the United Kingdom [Taffler and Tisshaw 1977], France [Altman, Margaine, Schlosser, and Vernimmen 1973 and Collongues 1977], and other European countries including Belgium, Netherlands [Abrahams and Frederikslust 1975], West Germany [Stein 1968 and Weinrich 1978], Italy, and Finland [Nakki 1976]. In Brazil, Kanitz [1974; 1976] has been the primary researcher in this area; to this date, his works and Tyler's in Colombia [1978] are the only ones we are familiar with on statistical failure prediction models in a developing country.

The remainder of this paper is organized as follows: The next section examines some of the recent aggregate statistics in Brazil with respect to firm risk and return data and also failure experience up to June 1977. Then, the methodological plan of the study is outlined and a description of the essence of the statistical technique used is given—namely, that of linear discriminant analysis. The section following will describe the sample selection procedure and its primary characteristics; fifty-eight Brazilian firms were selected with twenty-three comprising what we called the "serious-problem" (S-P) sample. Then, we shall discuss and report on the financial variables that are utilized in the failure prediction model. They are similar to the ones used in a prior study in the United States [Altman 1968] and adapted to Brazilian conditions. The penultimate section will present empirical results from two similar models, consisting of four financial ratios, and will discuss their accuracy in classifying serious-problem and no-problem firms accurately. The final section will discuss the study's implications and present concluding remarks. Of particular relevance will be the authors' views on applying such models in developing countries.

**RECENT BACKGROUND STATISTICS IN BRAZIL**

The Brazilian economy has enjoyed extraordinary growth in the last decade or so despite persistently high rates of inflation. The so-called "Brazilian Miracle," however, is generally believed to have been abating—at least temporarily—in recent years. Growth (gross domestic product) increased by 4.66 percent in 1977, which is still quite respectable by international standards. There have been, however, several troublesome statistics and trends in the last few years and these trends are expected to continue—even to worsen. Brazilian firms in general, both national and multinational, operate with fairly high leverage ratios. Table 1-A illustrates that the average debt/equity ratio in 1975 was over 110 percent—that is, 1.1 times, and reports are that 1976 statistics will show significantly higher ratios. These higher leverage figures mean, of course, increasing fixed financial expenses which, in Brazil's case, are cash outflows subject to monetary correction.