

A Paean to the Z-Score and Its Commercial Bankruptcy Prediction

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Questions about a commercial customer's potential for bankruptcy must be addressed through a means other than traditional financial analysis, which cannot clearly predict a company's insolvency. A company appearing financially fit may indeed be at the bankruptcy courthouse steps within a few short months. A bankruptcy prediction model can help loan officers to critically evaluate the financial health of a new or existing customer.

Souring loans with the potential for partial or complete write-off might be saved by the early intervention of loan officers. The ability to track a business environment's decline can mitigate the risk of a company filing for Chapter II protection without the lender's prior awareness of problems, a situation occurring with uncomfortable frequency. Use of a bankruptcy prediction model alerts the debtor and the creditor to the need for decisive action in time to stem a potential crisis.

The Z-Score

Bankruptcy prediction analysis is most efficiently handled through the Z-Score, a powerful diagnostic tool that along with other diagnostic procedures is used by turnaround professionals to develop an effective turnaround strategy for their clients.¹

In brief, the Z-Score forecasts the probability of a company entering bankruptcy within a 12-month period. Edward I. Altman, Ph.D., a financial economist and professor at New York University's Stern School of Business, developed the Z-Score in 1968.² Altman's model predicted with 95% accuracy which sample companies filed bankruptcy within 12 months. In later studies, using broader samples of companies analyzed during a variety of economic climates, the Z-Score accuracy rate remained in the 82% to 85% range.³

The model itself is not complicated. It combines five financial ratios using reported accounting information and equity values to produce an objective measure of a firm's financial health. Altman's Z-Score remains popular after almost 30 years because it is easy to calculate. Other bankruptcy prediction models exist, some of which are more accurate, especially over a horizon greater than two years. However, they are more complex and most are proprietary.

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The Z-Score Formula for Manufacturing Companies

The formula itself is a straightforward linear equation:

$$Z=1.2x_1 + 1.4x_2 + 3.3x_3 + .6x_4 + 1.0x_5$$

Z = Overall index of corporate health.

X₁ = Working capital divided by total assets.

x₂ = Retained earnings divided by total assets.

x₃ = Earnings before interest and taxes (EBIT) divided by total assets.

x₄ = Market value of preferred and common equity divided by total liabilities. (In nonpublic organizations, substitute the book value of preferred and common equity)

x₅ = Sales divided by total assets.

Compute the formula using the latest company financial statements and stock market equity values (or book value of equity for private entities.). The calculation will typically produce a Z-Score ranging from -5 to +10. In unusual cases, the Z-Score may be greater than +10 if the firm's equity value is high and total liabilities are low.

Altman's study concluded that manufacturing companies fall into the following predictive categories, as seen in Figure 1.

A Z-Score result in the gray area requires examination of the Z-Score trend over the past 18 months. A decline indicates the need for prompt corrective action. This represents the opportune moment for intervention by a loan officer to avert a potential problem loan.

It is important to note the bankruptcy prediction model is effective for most companies, but it should not be employed for analysis of divisions or for analysis of privately held subsidiaries.

The Z-Score Formula for Nonmanufacturing Industrial Companies

While the model was developed to analyze manufacturing companies, it can also be applied to non-manufacturing organizations by modifying the formula. To do so, the first four components of the formula (x₁ to x₄) are used and the fifth component (x₅) is omitted. The adjusted formula seems to provide equally valid predictive results.⁴

The predictive categories for nonmanufacturing industrial companies are seen in Figure 2.

Users of the Model

Financial statement users can employ the Z-Score for a variety of applications.

- Credit Evaluation—For loan officers and credit managers in accepting or rejecting loan applications.
- Private Investment Analyst – For stockbrokers and individual investors to evaluate the relative safety of a proposed investment.
- M & A Analysis—To consider an entity's viability both before and after a corporate reorganization.
- Turnaround Management—To develop emergency action plans and turnaround strategies to quickly correct a deteriorating situation.
- Insurance Underwriting—To evaluate the potential credit risk of the proposed insured including risk sharing and self-insured retentions.
- Corporate Governance—Board of Directors and Audit Committee analysis of going concern capability, consideration of corporate risk, and analysis of merger and acquisition scenarios.

Figure 1

SCORE	INTERPRETATION	SCORE
Public Companies 3.073 and above	Company has low probability of bankruptcy	Privately Held Companies 2.90 and above
3.075-1.875	Gray area— company requires careful monitoring	2.90-1.23
1.875 and below	Likelihood of insolvency within 12 months	1.23 and below

Figure 2

SCORE	INTERPRETATION
2.60 and above	Company has low probability of bankruptcy
1AO to 2.60	Gray area— company requires careful monitoring
1.10 and below	Likelihood of insolvency within 12 months