



Investment opportunities and bankruptcy prediction[☆]

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Abstract

A firm's mix of growth options and assets in place is an important determinant of its optimal default strategy. Our simple model shows that shareholders of a firm with valuable investment opportunities would be able/willing to wait longer before defaulting on their contractual debt obligations than shareholders of an otherwise identical firm without such opportunities. More importantly, we show empirically using a dataset of recent corporate bankruptcies that measures of investment opportunities are significantly related to the likelihood of bankruptcy. Augmenting existing bankruptcy prediction models by these measures improves their out-of-sample forecasting ability.

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1. Introduction

Bankruptcy constitutes an important event in a firm's life and impacts many parties associated with the defaulting firm. The value of the firm's shares is reduced because of the direct and indirect costs of financial distress (e.g., Maksimovic and Titman, 1991; Andrade and Kaplan, 1998). A typical return on the announcement of bankruptcy is negative (e.g., Altman, 1969). Moreover, there is evidence of negative returns to solvent firms in a bankrupt firm's industry (e.g., Lang and Stulz, 1992). Possible reasons for the latter are contagion and frailty, as suggested by Das, Duffie, Kapadia, and Saita (2006). Dichev (1998) documents that bankruptcy risk is related to stock returns. In addition, the likelihood of bankruptcy is an important input in debt pricing models (e.g., Duffie and Singleton, 1999). Therefore, it is important to be able to predict bankruptcy events. Many models have been proposed to forecast bankruptcy, starting from Beaver (1966) and Altman (1968), through Ohlson (1980) and Zmijewski (1984), to Charitou and Trigeorgis (2005), Shumway (2001), Chava and Jarrow (2004), Duffie, Saita, and Wang (2007), Bharath and Shumway (2008), and Campbell, Hilscher, and Szilagyi (2008), among others.

The main determinant of success of a bankruptcy prediction model is the set of variables it utilizes to distinguish firms that are about to default from future solvent firms. While the list of variables that have been employed in various bankruptcy prediction models is quite lengthy, it typically excludes a measure of firms' investment opportunities.² It turns out, however, that the mix of investment opportunities and assets in place is an important determinant of the likelihood of default. The logic is straightforward. On one hand, the more valuable a firm's growth options, the longer the shareholders are willing to wait and the higher the losses they are willing to sustain (and the more cash they are willing to inject into a struggling firm) before defaulting on their debt obligations and surrendering the firm to the debt holders. If a firm is endowed with a growth option then in the event of default its shareholders not only surrender the right to the profit flow generated by the assets in place but they also abandon the right to exercise the investment option in the future. Therefore, default is costlier for shareholders of a firm with considerable investment opportunities, and they would be willing to wait longer before making the decision to default on their debt obligations.

On the other hand, the more valuable the firm's investment opportunities, the higher the value of the residual claims on the firm's assets that do not accrue to current debt holders, and the easier it is to obtain external financing. This is true for both external equity and debt. Thus, regardless of whether bankruptcy is caused by the unwillingness of the shareholders to keep respecting their debt obligations or by their inability to raise external financing to keep servicing debt, the timing of default is related to investment opportunities. A simple model developed in the next section illustrates this point. It also helps identify a list of variables related to the probability of bankruptcy and the economic forces that drive these relations.

The main contribution of this paper is demonstrating that measures of investment opportunities are negatively related to the likelihood of bankruptcy in the data. There is a

²Campbell, Hilscher, and Szilagyi (2008) is a notable exception as they include the market-to-book ratio in their bankruptcy prediction model. The effect of market-to-book on the likelihood of bankruptcy that they report is different from our findings. We discuss the differences and examine their sources in the empirical part of the paper.

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