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Estimation of Implicit Bankruptcy Costs: Discussion

Author(s): Richard Ruback

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DISCUSSION

RICHARD RUBACK*: The paper by Kalaba, Langetieg, Rasakhoo, and Weinstein (KLRW) [1] presents a technique to extract an ex-ante measure of bankruptcy costs from the market price of a corporation's debt. Such a technique is important because ex-ante bankruptcy costs are a component of most conceptual models of optimal capital structure. However, the quantification of ex-ante bankruptcy costs has been elusive. Warner [4] provides some data on bankruptcy costs, but these data are for a particular industry (railroads) and measure only the direct costs of bankruptcy. The indirect costs of bankruptcy, such as the hesitancy of customers and suppliers to deal with the firm and the loss of human capital as skill workers leave the firm, may be substantially greater than the direct costs. These indirect costs are, of course, very difficult to directly measure.

KLRW present a technique to infer bankruptcy costs from bond prices. In our conceptual models, bankruptcy occurs, roughly speaking, when the market value of the equity becomes zero and the market value of the firm is less than or equal to the face value of the debt. The ownership of the corporation is then transferred to the bondholders. However, this transfer is not costless since corporate resources are consumed in dividing the remaining assets among the bondholders. Since the stockholders no longer have a claim to corporate assets, these direct bankruptcy costs are borne by the bondholders.

Bond prices reflect the present value of the cash flows received by bondholders. Since direct bankruptcy costs reduce the cash flow available to bondholders when default occurs, these costs are incorporated by rational investors when they price the debt. The market value of debt, therefore, reflects the direct bankruptcy costs and the probability that default will occur.

Indirect bankruptcy costs also affect the value of the firm that is transferred to bondholders upon default. However, at least some of the costs of financial distress are likely to be incurred prior to the actual default. These costs will be borne by virtually every agent that deals with the firm—bondholders, stockholders, suppliers, customers, and labor. Therefore, the market value of corporate debt will not include an ex-ante measure of *all* of the costs of financial distress and bankruptcy. Nevertheless, disentangling the component of these costs that is borne by bondholders is an important first step towards measuring bankruptcy costs.

KLRW use contingent claims analysis to value corporate debt. Their model explicitly includes three functional forms of bankruptcy costs. With the exception of bankruptcy costs, the KLRW analysis is similar to the paper by Jones, Mason and Rosenfeld [2]. Jones, Mason and Rosenfeld (JMR) apply their model to price the 305 bond issues by 27 firms: 176 of the bonds are "investment grade" whereas the other 129 bonds are substantially riskier. The empirical results by JMR indicate that their model can price debt fairly accurately and that the contingent claims analysis provides a better estimate of the market value of debt (particularly for the risky debt) than a naive pricing rule that ignored default risk. Of course, the JMR model bond price does not exactly equal the actual price of the bond.

* Sloan School of Management, Massachusetts Institute of Technology.

In the spirit of KLRW, it is tempting to conclude that these errors are due to bankruptcy costs. However, such a conclusion is unwarranted for several reasons. First, JMR show that their model overestimates some bond prices and underestimates others. It is difficult, therefore, to attribute this estimation error to bankruptcy costs because it is hard to envision negative bankruptcy costs. Second, there are other sources for these errors, such as stochastic interest rates, which are not fully incorporated into the JMR model. Third, this approach would label the estimation error as bankruptcy costs even though it is likely to include other missing factors in the model that affect bond prices; for example, the agency costs of debt.

KLRW do not present any empirical results. However, the discussion of quasilinear estimation suggests that they intend to use the technique to identify the variance rate and bankruptcy cost parameters in which their model provides the best description of bond prices. While this technique is not identical to attributing JMR's estimation error to bankruptcy costs, it is similar and therefore subject to the same types of errors. In particular, all forms of model misspecification, such as the assumption of certain interest rates and no agency costs, will affect the estimates of the bankruptcy cost parameters and variance rate.

Finally, I have a few technical concerns about the model in the paper. Perhaps most important is the assumption that default can only occur at maturity date. This assumption appears to be unrealistic when bonds have sinking fund provisions. Sinking funds even out the principle repayments so that the notion that stockholders will postpone default until maturity is inaccurate. Furthermore, the dynamics for the value of the firm in (1) and the differential equation in (3) appear to be inconsistent with the assumption that default can only occur at the maturity date. These equations imply that the entire firm is risky and that each payment to bondholders is risky. However, the assumption implies that a portion of the value of firm is riskless. This riskless portion of the firm equals the present value of the assumed riskless coupon and sinking fund payments throughout the life of the bond. The dynamics in (1), therefore, should be based on only the risky portion of the firm and (3) should not include the riskless coupon or sinking fund payments. The risky portion of the debt is actually identical to the risky pure discount debt examined in Merton [3]. As such, numerical solutions presented by KLRW (for the no bankruptcy models) should be comparable to the risk premiums contained in Merton [3].

My second technical concern regards the treatment of multiple bond issues. In the simulations, the authors argue that multiple debt issues can lead to a "liquidity crisis" which can cause bankruptcy during the life of the bond. The probability of a liquidity crisis is arbitrarily assumed to be a hyperbolic tangent function. Clearly, the general issue of default prior to maturity and the impact of multiple bond issues requires more analysis.

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