corporate rate in order to explain the existence of unlevered firms, and, at those rates, the annual rate of return advantage to debt is small. We conclude that the tax advantage/bankruptcy cost tradeoff is unlikely to play a major role in explaining observed leverage patterns.

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DISCUSSION

RONALD W. MASULIS*: The basic objective of the paper, "How Big Is the Tax Advantage to Debt?" is to present "evidence as to whether bankruptcy-cost models which take account of personal as well as corporate taxes can explain the observed range of debt ratios in the U.S. economy." Toward this end, Kane, Marcus, and McDonald explore the comparative static properties of such a model

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of firm valuation set in an option pricing framework. Unfortunately, their results are severely limited in their generality.

Before considering the model presented in this paper, a review of the structure of the tax-bankruptcy model is needed. In the DeAngelo-Masulis capital structure model, which they cite, a firm's optimum leverage ratio is determined at the point where the expected marginal tax advantage of debt is equal to the expected marginal cost of leverage. It follows that the two major factors in this model which explain cross-sectional differences in optimal leverage ratios of firms are (1) differences in the expected values of debt tax shields, caused by differing levels of nondebt tax deductions and credits available to the firm and (2) differing expected costs of leverage, a notable example being bankruptcy costs. If one is to reasonably assess the descriptive validity of this type of tax-bankruptcy model, significant cross-sectional variability in these two factors must be considered. In the following discussion, it will be shown that the analysis of Kane, Marcus, and McDonald is restricted to cases where (1) the cross-sectional variability in the expected values of debt tax shields is eliminated and (2) the cross-sectional variability in the *expected* cost of bankruptcy is significantly restricted.

There are three critical assumptions made in the Kane, Marcus, and McDonald model which effectively restrict its generality:

(A) The model assumes a very specific mixed diffusion-jump process on the value of a firm's assets which yields a very low probability of bankruptcy. (Exactly how small this probability is cannot be easily determined since the authors fail to present any information on this important issue.)

(B) The analysis assumes costless and frequent leverage rebalancing of a pure discount debt issue and avoids introducing any protective covenants which could trigger early default on the debt. This has the effect of further decreasing the probability of bankruptcy.

(C) The model assumes a full tax loss offset which precludes any probability of an unused tax shield when the firm is solvent.

The effect of assumptions A and B is to insure that the size of the probability of bankruptcy is sufficiently small that changes in the bankruptcy cost function or the firm's rate of return variance will not significantly change the *expected* marginal cost of bankruptcy. Increases in the risk of ruin, λ, should generally increase the expected marginal cost of bankruptcy, but this is not a property of the model. Thus, the analysis allows for little cross-sectional variability in expected bankruptcy costs. These assumptions also have the effect of decreasing the expected bankruptcy costs at any level of leverage. Assumption C has two effects. First, it increases the expected marginal value of the firm's debt tax shield. More importantly, it eliminates any possible cross-sectional variation in the debt tax shield's expected marginal value for any given leverage ratio.

Given the implications of asumptions A-C, it is hardly surprising that the Kane-Marcus-McDonald model yields predictions of relatively high leverage ratios and fails to yield predictions of cross-sectional differences in leverage ratios of the magnitude observed in the U.S. However, this is not a consequence of the structure of the tax-bankruptcy cost model; rather it is a direct result of the specialized assumptions made in this paper.

Two final points need to be made. First, the model exhibits a rather troubling property: as the risk of ruin (represented by λ) increases, the firm's optimal leverage rises. This reflects the benefits of a higher risk induced interest tax deduction and the questionable assumption that the risk of ruin, λ, is independent of leverage. Given that an increase in λ implies both an increase in expected marginal costs of bankruptcy and a decrease in the expected marginal tax advantages of debt, it is an unfortunate property of the model that it predicts a resulting *rise* in the optimal level of debt. This property is certainly inconsistent with that of the standard tax-bankruptcy cost model. The second point is that the paper makes an additional questionable assumption: that asset prices which increase firm debt capacity are bid up to capture the expected tax advantage of debt net of bankruptcy penalties. The expected return on these assets is then lowered to the endogenously determined point where the market value of these assets is equal to the market value of the optimally levered firm. However, if optimal leverage ratios can differ across firms, it is not clear how competition among firms to purchase these assets could yield such a condition. Certainly, many firms will be infra-marginal purchasers of assets.