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Optimal Financial Policy and Firm Valuation: Discussion

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DISCUSSION

DAVID EMANUEL*: In this paper, Professors Brennan and Schwartz have tackled a problem of considerable merit and horrendous difficulty, namely that of applying the continuous time valuation framework to firms that are subject to realistic constraints. In particular, they distinguish between the book and market values of the assets and liabilities of a firm and financial constraints are posed in terms of plausible accounting ratios. I like the basic approach that is employed and Brennan and Schwartz have used it quite successfully and productively in this paper. It is clear that this is one of the first steps in a fertile and challenging new area of corporate financial theory. My remaining comments are critical of relatively minor details and should not be viewed as indicating dissatisfaction with the overall paper.

The paper starts with the development of an equilibrium valuation model for contingent claims in the manner of Cox, Ingersoll and Ross (1978). The general model is then simplified considerably to make it analytically tractable. I do not particularly like having to assume constant proportional risk aversion, but there is not any choice as the need to simplify will be with us forever. I do not think

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that the assumption in equation (20) has any disturbing side effects in this particular case.

In this application, the basic stochastic process driving the model is x , the accounting rate of return on assets in place (A) after allowing for economic depreciation. New investment earns a rate of return ρ , which is deterministic apart from possible dependence on g and x . This type of model is probably quite realistic for a regulated firm which is subject to external determination of the allowable rate of return (i.e. x) on its rate base (A). I am less sure that the formulation is applicable to the typical competitive firm which faces general economic uncertainty and also the risk of technological obsolescence. When existing assets become obsolete, the rate of return on new assets will clearly differ from the rate of return on old assets. Under suitable competitive assumptions, the return on new assets may be constant while the return on old assets declines as a result of the greater productivity of new assets. What this suggests is that it may be inappropriate to treat the rate of return on existing assets (x) as the basic stochastic process. (Nevertheless, it may be possible to use a derived variable, such as x , in lieu of a more primitive stochastic variable.) If one recognizes technological risk as a factor, then the scrapping of existing assets, which is excluded in this model, could profitably be explored.

I am overstating my objection. This paper is concerned with financial policy rather than investment decisions. So, a parsimonious description of the operating environment is appropriate. Still, future research on the investment decision might do well to contemplate plausible circumstances (such as exponentially distributed asset life?) under which a simple measure, like x , will suffice to capture the divergence between book and market values of assets. It may be possible to make a convincing case for the simple dependence on x that Brennan and Schwartz employ. In other situations, it may be impossible to rely on anything less than the entire asset history of the firm when analysing the investment decision.

We should return to the main focus of the paper, the financial policy of an evolving firm. I might as well make the obligatory cheap observation that personal taxes are ignored and interest rates are assumed to be constant. These are understandable omissions. We still do not really understand how personal and corporate taxes interact. Nor do we yet have a particularly good model of the stochastic processes generating interest rates. However, interest rate changes are of some concern to the debt owing firm. Adding a stochastic interest rate would increase the number of relevant state variables to four, two of which would be stochastic. Numerical analysis of this enlarged problem would tax a modern computer. However, I am quite hopeful that we shall shortly see both faster computers (obviously) and better numerical analysis techniques.

As far as the rest of the financial modelling is concerned, I find it quite appropriate and neatly done. I just have a couple of observations.

First, the observation that, under rational expectations and symmetric information, firm value cannot increase with leverage is very interesting. This is driven by the quite natural framework which allows virtually instantaneous debt expansion. If today's debt level is too low, it will not affect the value of the firm today, because everybody knows that the debt level is about to be adjusted to the

optimal level. As Brennan and Schwartz point out, this can lead to confusing signals. A desirable rise in the debt level may elicit no discernible market response, having been already fully anticipated by rational market players. Instead, we may have to look at individual firms' financial policies over long intervals of time, so that we may classify them as well run or poorly run financially. If such a classification were possible, only the poorly run firms should show any market response to financial policy changes, *ceteris paribus*. In this paper, I would have found some graphical representation of "typical" longitudinal sample paths quite informative. It might well convey some useful insight into the observable behavior of well run firms over time. The graphs in Figure 1-3 are informative, but a little hard to interpret.

The terseness of the paper confused me at a few points. For example, in equation (30), the term $F(x,A,T)$ is introduced to describe "the value of the firm at time T (the date the debt matures) assuming that the value maximizing amount of new debt is issued." The implication is that the firm can issue new debt after being reorganized due to bankruptcy. Later on, the term $E(x,A,0,t)$ is used to describe the value of the firm after bankruptcy occurs at time t (i.e. before maturity at time T). I think that $E(x,A,0,T)$ is the same as $F(x,A,T)$, but it takes a bit of digging for an obtuse discussant to find that out.

Anyway, despite my nitpicking, this is a very fine paper. I think that it opens up an exciting area of corporate financial theory. Clearly, it is a further indication of the vigor, durability and viability of the continuous time approach to finance. The explosive growth in this area will not abate for some time yet.

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