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Future Investment Opportunities and the Value of the Call Provision on a Bond: Comment

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IN A RECENT ARTICLE in this Journal, Bodie and Taggart [4] (henceforth abbreviated as B-T) argue that the existence of non-callable long-term debt in the firm's capital structure will have an adverse incentive effect on the firm's investment behaviour in the presence of growth opportunities. Specifically, if there is non-callable risky debt in the firm's capital structure, bondholders will share with stockholders in any profitable future investments thus curtailing the firm's incentive to invest the proper amount in such states of the world. This externality to shareholding, B-T maintain, rationalizes the existence of the call provision as a standard feature of long-term bonds since, by calling the debt, stockholders are able to appropriate all of the gains from their discretionary powers over future investment opportunities.

Although B-T's conclusions have some merit, their results do not follow from the assumptions of their model. Indeed, by employing their model, which assumes away transactions costs,[1] one can show that the firm's future investment decisions are independent of past financing decisions. As we show below, any externalities generated by the existence of non-callable debt, when there are future investment opportunities, will be completely internalized prior to undertaking these investments. This internalization will, in turn, be reflected in the initial contractual agreements entered into by the claimants on the firm. Therefore, Modigliano and Miller are correct irrespective of future growth opportunities.

If the B-T paper is to be taken in the spirit of the agency literature—this would be a very generous interpretation of their paper—the authors must specify the type of transaction cost or market imperfection which the call provision presumably reduces. In the agency literature one tries to show why a particular set of transaction or agency costs rationalize a particular contractual arrangement. Such a demonstration is not forthcoming in the B-T paper. However, our discussion below provides one such rationale for the call provision, namely, it eliminates negotiation costs.

B-T make the usual assumptions which are a prerequisite for a frictionless financial system to contrast the investment policy of an all equity firm, for which there are no potential externalities, with that of an equivalent firm initially partially financed with non-callable long-term debt.[2] Their equations (15) and

[1] In fact they are able to prove the Modigliani-Miller [7] theorem in the no-growth case.

[2] The B-T model is predicated on market-power related imperfections in the real asset market since the firm is assumed to be able to appropriate growth opportunities in favourable states of nature. If the real asset market is competitive, no rents will be generated to any firm even if there is industry wide growth. See Aivazian and Callen [1].

(18) implicitly define the optimal investment policies $\hat{I}_1^e$ and $\hat{I}_1^n$ of the unlevered and levered firm, respectively, in face of growth opportunities. Comparing these equations it would appear that the all equity firm invests more than the levered firm since both equations are the same except for the limits of integration. In other words, the presence of long-term non-callable debt curtails the stockholders' incentive to invest in period one since part of the gains will accrue to the bondholders. This is the crux of the B-T argument and from which they conclude that the value of the unlevered firm, or one with callable debt, is greater than that of the levered firm with non-callable debt.

The flaw in the B-T argument is that, in the perfect markets framework assumed by them, it will be in the interests of shareholders and bondholders to negotiate and fully internalize the externality generated by debt in the firm's capital structure when there are growth opportunities. In fact, the Coase Theorem [5] guarantees that the internalization will take place in the absence of transactions costs. Thus, it will be in the interest of stockholders to buy up all the debt, or of bondholders to buy up all the stock (or an outside party could buy up the firm's securities), and subsequently undertake net-present-value maximization which will generate the full optimal level of investment.[3]

Utilizing B-T's model let us consider the case where stockholders buy up all the debt when there are favourable investment opportunities at $t = 1$. The maximum price that stockholders are willing to pay is

$$\bar{D}_1 = \int_{\theta_n}^{\infty} \frac{(1 + R_n)^2 D_0}{(1 + \rho)} dF(\theta/\mu) + \int_0^{\theta_n} \frac{\theta[R(I_0) + G(\hat{I}_1^e, \mu)]}{(1 + \rho)} dF(\theta/\mu) \tag{1}$$

where θ_n is the point of bankruptcy defined by $\theta_n[R(I_0) + G(I_1, \mu)] = (1 + R_n)^2 D_0$. Equation (1) reflects the firm's enhanced investment opportunity in period one because of the elimination of debt from its capital structure. On the other hand, the minimum price bondholders are willing to accept for the debt is

$$\underline{D}_1 = \int_{\theta_n}^{\infty} \frac{(1 + R_n)^2 D_0}{(1 + \rho)} dF(\theta/\mu) + \int_0^{\theta_n} \frac{\theta[R(I_0) + G(\hat{I}_1^n, \mu)]}{(1 + \rho)} dF(\theta/\mu) \tag{2}$$

The latter reflects the firm's curtailed investment in period one because of the existence of debt in its capital structure.

Although B-T recognize that stockholders could buy back the debt, they reject this alternative by suggesting that bondholders will be in a position to demand a price close to $\bar{D}_1$ weakening shareholders' incentive to invest.[4] Thus stockholders, they imply, would be indifferent between (i) buying back the debt and undertaking the investment $\hat{I}_1^e$ and (ii) not buying the debt and undertaking the suboptimal

[3] See also Fama [6, p. 283]. It should be pointed out that even in perfect capital markets the problem exists of allocating the rents generated by growth opportunities among the various claimants on the firm. This allocation process is internal to the firm involving negotiations among the claimants. The implication of perfect markets to this allocation process is simply that in such markets negotiation costs are zero so that the Coase Theorem becomes operative.

[4] See their footnotes 13, p. 1197.

investment $\hat{I}_1^n$. This neglects the potential gains from trade since it is in the bondholders' interest to require an amount less than the maximum payment and, thus, share part of the future benefits from the investment. In fact, bondholders may be convinced to take as low a price as $\underline{D}_1$ for their debt. Of course, they may balk at accepting $\underline{D}_1$ exactly, but then it is in shareholders' interest to offer some higher price so that bondholders share in the gains. The price actually paid for the debt is uncertain but, in the absence of transaction costs, the Coase Theorem insures that some mutually satisfactory price will be negotiated for the debt, enabling stockholders to fully internalize the externality and to undertake the full optimal level of investment $\hat{I}_1^e$.[5]

It is worth noting that the call provision insures that bondholders are compensated a specific price (closer to $\underline{D}_1$, perhaps, than $\bar{D}_1$) avoiding the price uncertainty associated with the negotiated settlement in the future. However, ex-ante in period zero, the return which bondholders require will reflect their expected future compensation. To the extent that in negotiations they expect to receive a higher price for their debt, they will require a lower return than if there is a call feature. Ex-ante, the call feature in a perfect capital market is simply redundant.[6]

Once transactions costs are introduced the above internalization procedures become costly. The principal cost element is likely to be the time consuming process of negotiating to buy back the debt or, in the case of a third party, all of

[5] Formally, suppose the shareholders buy up the debt at a price D_1 ($\underline{D}_1 < D_1 < \bar{D}_1$). Then, D_1 represents a negotiated lump-sum payment from shareholders to bondholders so that

$$N_1^{nb} = \int_0^\infty \frac{\theta[R(I_0) + G(I_1, \mu)]\, dF(\theta/\mu)}{(1+\rho)} - D_1 - I_1$$

where N_1^{nb} is the value of the firm's equity at $t = 1$ after buying back the debt. Thus, the firm's optimal investment in period one is given by

$$\frac{\partial N_1^{nb}}{\partial I_1} = \frac{\int_0^\infty \left(\frac{\partial G}{\partial I_1}\right) dF(\theta/\mu)}{(1+\rho)} - 1 = 0$$

which is the same optimality condition as for the all-equity firm, so that the optimal investment is $\hat{I}_1^e$. In the efficient markets framework assumed by B-T, the net present value of debt in period zero will fully reflect the expected compensation D_1 in states of nature favourable to growth in period one. Also the value of the levered firm's shares in period zero will reflect shareholders' optimal strategy in period one, i.e. to buy back the debt and undertake the full optimal level of investment. It is then a straightforward matter to show that the value, at time zero, of the levered firm's shares is equal to that of the all-equity firm.

[6] These arguments raise some additional deeper issues which only became apparent to us after this comment was submitted for publication. With more than two claimants the negotiation process (game) could have an empty core in which case the Coase Theorem may not be valid. The call feature could then be rationalized as a means of precluding empty-core possibilities. Also, the ex-ante valuation of claims in this example is not unambiguous, but requires the determination of the certainty-equivalent of a lottery over games, and standard Finance paradigms are ill-equipped to handle such valuation problems. For an analysis of these issues in the context of the Coase Theorem and their implications for rationalizing specific financial instruments and institutions, see our forthcoming papers [2] and [3].

the firm's claims. The call provision may then be rationalized as a device for reducing such costs. Nowhere in their paper do B-T hint at bargaining and its attendant costs.

REFERENCES

1. V. Aivazian and J. L. Callen. "Investment, Market Structure, and the Cost of Capital." *Journal of Finance*, Volume 34, Number 1 (March, 1979).
2. _____ and _____, "Corporate Leverage and Growth: The Game-Theoretic Issues," *Journal of Financial Economics*, forthcoming.
3. _____ and _____, "The Coase Theorem and the Empty Core," *Journal of Law and Economics*, forthcoming.
4. Z. Bodie and R. A. Taggart, Jr. "Future Investment Opportunities and the Value of the Call Provision on a Bond." *Journal of Finance*, Volume 33, Number 4 (September 1978).
5. R. H. Coase. "The Problem of Social Cost." *Journal of Law and Economics*, Volume 3, (October 1960).
6. E. F. Fama. "The Effects of a Firm's Investment and Financing Decisions on the Welfare of its Security Holders." *American Economic Review*, Volume 68, Number 3 (June 1978).
7. F. Modigliani and M. H. Miller. "The Cost of Capital, Corporation Finance and the Theory of Investment." *American Economic Review*, Volume 48, Number 3 (June, 1958).