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Corporate spin-offs, bankruptcy, investment, and the value of debt

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Abstract

In a risk-neutral stochastic environment where bankruptcy is possible, it is well-established that coinsurance incentives may lead creditors to prefer mergers over spin-offs, while shareholders may prefer spin-offs. This paper shows that there are two distinct reasons for this. One is due to the concavity of the debt payoff function in the face value of the debt, while the other arises from imperfect covariation in ultimate firm values. For the latter reason, conventional measures of covariation are not sufficient to evaluate the impact on ex-ante debt value. Also considered are the effects of mergers and spin-offs on investment decisions.

Keywords: Bankruptcy; Covariation; Investment; Merger; Spin-off

JEL classification: G34; L20

1. Introduction

Among the many motives for merger and spin-off activities, we focus upon the effects such decisions may have upon the values of claims on firm assets. That there may be some truth to several theories concerning mergers and spin-offs is evidenced by the inconclusive results arising from empirical analyses of the effects of such re-organizations on the values of claims on assets. Berger and Ofek (1995) provide a survey of empirical studies. As explained by Higgins and Schall (1975), in the absence of synergy, tax distortions, or decisions to adjust debt subsequent to a corporate re-organization, the sum of bondholder value and shareholder value is invariant to the re-organization.

The idea that shareholders benefit from spin-offs at the expense of bondholders has been formalized by Higgins and Schall (1975), Galai and Masulis (1976), Scott (1977), and MacMinn and Brockett (1995) among others. We return to their analysis, which we call the coinsurance motive for corporate restructuring, and decompose their overall effect into two distinct effects. We then show that the magnitude of one of these incentives to spin-off depends upon how dispersed the asset/debt ratios are of the spun-off firms. The magnitude of the other incentive to spin-off is shown to depend upon the nature of covariation among the stochastic values of the partitioned business assets. While a change in the covariance statistic is not sufficient to have a determinate impact on the incentive for firms to re-organize, we identify a type of change in covariation that is sufficiently structured to have a determinate impact. The results should help corporate financiers sifting through the many impacts of restructuring on the value

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of contingent claims on corporate assets to ascertain whether the coinsurance motive merits weighty or negligible consideration. The final component of our analysis studies the implications of the interactions between stochastic realizations and structural organization for investment decisions made by a firm facing a significant probability of bankruptcy.

2. The problem

At time 0 in a two period model, two independent firms contemplate a merger. Our problem is to analyze the impacts of such a merger on the aggregate value of debt for risk-neutral creditors. Firm A has debt which will have face value D_A at time 1 while the time 1 face value of firm B's debt is D_B. The realization of firm j value gross of debt at time 1 is V_j, $j \in \{A, B\}$, where the V_j are random and are supported on $V_A \times V_B \in [0, T_A] \times [0, T_B]$, $T_A > D_A$, $T_B > D_B$. The time 1 summed net value of debt for the independent firms is $\min[D_A, V_A] + \min[D_B, V_B]$. The time 1 value of the merged firm would be $\min[D_A + D_B, V_A + V_B]$. From Scott (1977), among others, it is well know that

$$\min[D_A + D_B, V_A + V_B] \geq \min[D_A, V_A] + \min[D_B, V_B], \tag{1}$$

and so $E\{\min[D_A + D_B, V_A + V_B]\} \geq E\{\min[D_A, V_A]\} + E\{\min[D_B, V_B]\}$, where $E\{\cdot\}$ is the expectation operator taken over the joint distribution of time 1 gross firm values. Following the reasoning of MacMinn and Brockett (1995), the Modigliani and Miller theorem then implies that, given the pertinent assumptions, mergers decrease the aggregate expected wealth of shareholders. Questions we address include why this inequality arises and what determines the magnitude of the inequality. We also consider how mergers and other organizational alterations that affect stochastic impacts alter the incentive to invest.

3. Perfect rank correlation

Following Scott (1977), the state space may be decomposed into six regions, these being regions I–VI as defined in Table 1. The unmerged and merged values are the same in regions I (i.e., $\{(V_A, V_B) : V_A \leq D_A, V_B \leq D_B\}$) and IV (i.e., $\{(V_A, V_B) : V_A > D_A, V_B > D_B\}$), but unmerged value is less than the merged value otherwise. If the state space can be restricted so that only regions I and IV have strictly positive measure, then ex-ante expected value of debt is invariant to the merger. Thus it is required that $\text{prob}[V_A \leq D_A, V_B > D_B] = \text{prob}[V_A > D_A, V_B \leq D_B] = 0$. This is unlikely when the state space is diffused over two dimensions rather than concentrated on a curve because regions I and IV are diagonally opposed. It is impossible when $V_A \times V_B$ has strictly positive measure on all measurable subsets of $[0, T_A] \times [0, T_B]$. It is more likely if the variables are dependent. Consider the case where there is perfect rank dependence:

Table 1
State contingent values of aggregate debt for unmerged and merged firms

Region	Conditions	Unmerged value	Merged value
I	$V_A \leq D_A, V_B \leq D_B$	$V_A + V_B$	$V_A + V_B$
II	$V_A \leq D_A, V_B > D_B, V_A + V_B \leq D_A + D_B$	$V_A + D_B$	$V_A + V_B$
III	$V_A \leq D_A, V_B > D_B, V_A + V_B > D_A + D_B$	$V_A + D_B$	$D_A + D_B$
IV	$V_A > D_A, V_B > D_B$	$D_A + D_B$	$D_A + D_B$
V	$V_A > D_A, V_B \leq D_B, V_A + V_B \leq D_A + D_B$	$D_A + V_B$	$V_A + V_B$
VI	$V_A > D_A, V_B \leq D_B, V_A + V_B > D_A + D_B$	$D_A + V_B$	$D_A + D_B$