Class 4: debt overhang

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The lectures on debt overhang stress the difficulties of renegotiation; this problem set follows Myers (1977) in emphasising the interests in which the firm acts.

Consider a two period world in which a firm first chooses a capital structure. There are $N$ possible states of the economy in the future, $s_1, \ldots, s_N$, with the $n^{th}$ expected to arise with probability $\pi_n$. Once the firm’s managers learn which state occurs, they decide whether or not to undertake an investment. The investment costs $I$ to undertake, and yields return $R(s_n)$ in state $s_n$, with states ranked so that $R(s_1) < \cdots < R(s_n) < \cdots < R(s_N)$. The firm has no other assets; there are no taxes or transactions costs; there are no agency costs, meaning that managers implement shareholders’ wishes.

1. What is the efficient investment rule?

2. Suppose first that the firm initially raised $I$ via equity financing.
   (a) What investment rule do the shareholders instruct management to adopt? Denote the least profitable state in which the shareholders agree to invest by $s_a$.
   (b) What is the expected value of the equity-financed firm initially?

3. Now suppose that the firm initially issued a mix of debt and equity to raise $I$, and that $D$ must be repaid.
(a) What investment rule do the shareholders instruct management to adopt? Denote the least profitable state in which the shareholders agree to invest by $s_b$.

(b) What is the expected value of the equity-financed firm initially?

4. Optimal capital structure

(a) Which capital structure maximises the value of the firm?

(b) Comment on what happens in states $s_a, \ldots, s_{b-1}$.

(c) What might debtholders try to do in states $s_a, \ldots, s_{b-1}$? Why might this not be possible?

References