Corporate Finance

Assignment 3

1. Consider a firm with an initial value $V = 400$, an original pure-discount debt that pays $X = 400$ in three years, and for which

$$V_3 = \begin{cases} V_3^u = 650 & \text{with probability } p = 0.7, \\ V_3^d = 250 & \text{with probability } 1 - p = 0.3. \end{cases}$$

The risk-free rate is $r_f = 5\%$.

   (a) Compute the current values of debt (D) and equity (E)

   (b) Compute updated parameter values after the following actions. Management issues additional pure-discount debt that has a promised payment of \$605.3 in three years and with the same priority over the firm's assets as the original debt. This new debt is sold at its market value and management uses the proceeds to double the firm's operations (i.e. V, V_3^u and V_3^d all double in value). What is the effect of this expansion on the current values of original debt and equity?

2. Consider a firm with the same parameter values as in Problem 1. Assume now that the firm has \$142.5 of idle cash invested in a risk-free security.

   (a) Compute updated parameter values after management uses all the idle cash to pay a dividend to shareholders. What is the effect of this action on the current values of debt and equity?

(b) Compute updated parameter values after management uses the idle cash to retire half the firm's debt at the price of \$142.5. What is the effect of this action on the current values of debt and equity?

(c) Compute updated parameter values after management uses the idle cash to finance a project that pays \$200 with probability one in three years. What is the effect of this action on the current values of debt and equity?

(d) Which case do shareholders prefer? (a), (b) or (c)? Explain.

3. Consider a firm with the same parameter values as in Problem 1. Suppose now that projects can be undertaken by the firm only if shareholders contribute the initial outlay out of their own pockets.

   (a) Consider first a risk-free project that pays \$200 with probability one after three years and that requires an initial outlay of \$142.5. Will shareholders accept to finance this project?

   (b) Suppose now that the firm has identified another project that pays off either $P_3^u = \$328.5$ in the "up" state or $P_3^d = \$0$ in the "down" state. This project also requires an initial outlay of \$142.5. Using a rate of return of 10%, management has determined that the net present value of this project is

$$\frac{.7 \times 328.5 + .3 \times 0}{(1.1)^3} - 142.5 = \$30.3.$$

   Note that this project's NPV is almost the same as the risk-free project described in (a). Will shareholders accept to finance this project? Is your answer different from what you found in (a)? Why?

4. Consider a firm with the same parameter values as in Problem 1. Suppose now that the firm's management, fearing that they will lose their jobs if the firm goes bankrupt, immediately sell all of the firm's assets for a fair price of \$400, and invest the proceeds in a risk-free security. How does this action affect current values of debt and equity?