Appendix 17A Some Useful Formulas of Financial Structure

Definitions:

- E(EBIT) = A perpetual expectation of cash operating income before interest and taxes.
- V_U = Value of an unlevered firm.
- V_L = Value of levered firm.
- B = Present value of debt.
- S = Present value of equity.
- R_S = Cost of equity.
- R_B = Cost of debt capital.
- R_0 = Cost of capital to an all-equity firm. In a world of no corporate taxes, the weighted average cost of capital to a levered firm, R_{WACC}, is also equal to R_0. However, with corporate taxes, R_0 is above R_{WACC} for a levered firm.

Model I (No Tax):

$$V_L = V_U = \frac{\text{E(EBIT)}}{R_0}$$

$$R_S = R_0 + (R_0 - R_B) \times B/S$$

Model II (Corporate Tax, $t_C > 0$; No Personal Taxes, $t_S = t_B = 0$):

$$V_L = \frac{\text{E[EBIT]} \times (1 - t_C)}{R_0} + \frac{t_C R_B B}{R_B} = V_U + t_C B$$

$$R_S = R_0 + (1 - t_C) \times (R_0 - R_B) \times B/S$$

Model III (Corporate Tax, $t_C > 0$; Personal Tax, $t_B > 0$; $t_S > 0$):

$$V_L = V_U + \left[1 - \frac{(1 - t_C) \times (1 - t_S)}{(1 - t_B)}\right] \times B$$