Proposition II (no tax world)

The required rate of return on levered equity, r_s, is equal to the required rate of return on unlevered equity, plus a risk premium proportional to the amount of debt, since debt financing increases the risk to equity investors.

Equation of Proposition II (no tax world)

$$r_s = r_0 + (B / S_L) (r_0 - r_B)$$

r_B is the interest rate (cost of debt)
r_s is the return on (levered) equity (cost of equity)
r_0 is the return on unlevered equity (cost of capital)
B is the value of debt
S_L is the value of levered equity

Note that "r" and "R" used in the text chapter and lecture slides, are interchangeable.

Proposition II (no tax world) is derived from the WACC equation, with r_o substituted for the WACC. We can do this because the WACC for an unlevered firm is just its required rate of return on unlevered equity.

$$WACC = (B/V_L)\ r_B + (S_L/V_L)\ r_S$$

where

$$V_L = B + S_L$$

Note: The required return on the all equity firm, r_0, also turns out to be the WACC of the firm in a world without corporate taxes.

Footnote 8 in Chapter 16 in the assigned textbook shows the derivation for Proposition II (no tax world).

The conclusion of MM's 1958 paper is that capital structure is irrelevant to firm value. Firm value is driven by expected future operating income. As debt level rises, the equity becomes more risky and thus, has a higher required rate of return. The weighted average cost of capital (WACC) stays the same however, because the higher required rate of return on equity is cancelled out by the use of more debt, since debt is the lowest cost component of capital. No matter what the capital structure, the operating cash flows of the firm are discounted at the same discount rate, the WACC. Thus firm value is not affected by capital structure.

Reference Lecture Slides 38 and 39 for numerical illustration!

To view a graph of the costs of debt and equity and the WACC as debt level increases, see 16.3 in the assigned textbook or see the graph below.