M339W: April 25th, 2022.

3. A company is financed by 1000 shares of stock with a current market value of 100 per share. The company decides to issue 50 5-year bonds with a par value of 100 and an annual coupon rate of 8% and use the proceeds to pay a cash dividend to the company's shareholders. The bonds sell at a market value that provides an annual effective yield of 10%.

Assuming that Modigliani-Miller Proposition I holds, what is the market value per share of the company's stock immediately after the dividend payment?

→: By Miller·Modigliani I,

$\boxed{\text{MV of equity (prior to bond)}} = \boxed{\text{MV of equity (after the bond)}} + \boxed{\text{Value of bonds}}$

aka the value of the dividend

(# of shares)x(market price per share before bond)

= 1000 (100) = 100,000

(A) 95.0

(B) 95.4

X (C) 100.0

X (D) 104.6

X (E) 105.0

Value of a single bond:

$$coup \cdot a_{\overline{n}|} + C(1+i)^{-n} = 8\,a_{\overline{5}|0.10} + 100(1.10)^{-5}$$

$$= 8 \cdot \frac{1-(1.1)^{-5}}{0.10} + 100(1.10)^{-5}$$

$$= 92.41843$$

⇒ MV of equity (after the bond) = MV of equity (prior to bond) − value of bonds

= 100,000 − 50(92.41843)

= 95 379.0787

⇒ the new value per share is 95.3790787 □

Miller · Modigliani Proposition II.

	Return
E ... market value of equity	R_E
D ... market value of debt	R_D
U ... market value of equity if the company were unlevered	R_U

$\Rightarrow$

$$\boxed{R_U = \frac{E}{D+E} R_E + \frac{D}{D+E} R_D}$$ ✓

debt · to · value ratio

$\Rightarrow$ $(D+E) R_U = E \cdot R_E + D \cdot R_D$

$\Rightarrow$ $E \cdot R_E = (D+E) \cdot R_U - D \cdot R_D$

$= E \cdot R_U + D(R_U - R_D) \quad / : E$

$\Rightarrow$ $R_E = R_U + \frac{D}{E}(R_U - R_D)$ (II)

additional "risk" due to leveraging

return without leveraging

debt · to equity ratio

1st Attack (II) w/ the expectation:

$$\boxed{r_E = r_U + \frac{D}{E}(r_U - r_D)}$$

The cost of capital of levered equity increases w/ the debt · to · equity ratio.

$$\boxed{r_U = \frac{E}{D+E} \cdot r_E + \frac{D}{D+E} r_D}$$

... the pre tax weighted average cost of capital (wacc)

2nd Attack (II) w/ the Cov[· , R_{Mkt}]:

$$\boxed{\begin{aligned} \beta_E &= \beta_U + \frac{D}{E}(\beta_U - \beta_D) \\ \beta_U &= \frac{E}{D+E} \beta_E + \frac{D}{D+E} \cdot \beta_D \end{aligned}}$$