ADM 2350 (Summer)

Solutions to

Dividend Policy Problems

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Problem 1: Current value of equity = 100,000 shares outstanding at $70 per share = 100,000 x $70.

a. The five-for-three split means, the number of new shares outstanding will become:

$$100{,}000 \text{ x } \frac{5}{3}.$$

Therefore, price per share will become:

$$= \frac{100{,}000 \text{ x } \$70}{100{,}000 \text{ x } \frac{5}{3}} = \frac{\$70}{\frac{5}{3}} = \$70\left(\frac{3}{5}\right) = \$42$$

b. Using the same logic as in part a:

$$\frac{100{,}000 \text{ x } \$70}{100{,}000 \text{ x } (1+.15)} = \frac{\$70}{1.15} = \$60.87$$

c. Share price $= \dfrac{100{,}000 \text{ x } \$70}{100{,}000\ (1+.425)} = \dfrac{\$70}{1.425} = \$49.12$

d. Share price $= \dfrac{100{,}000 \text{ x } \$70}{100{,}000 \text{ x } \frac{4}{7}} = \dfrac{\$70}{\frac{4}{7}} = \$70 \text{ x } \dfrac{7}{4} = \$122.50$

e. a. $100{,}000 \text{ x } \dfrac{5}{3} = 160{,}667$

b. $100{,}000(1.15) = 115{,}000$

c. $100{,}000(1.425) = 142{,}500$

d. $100{,}000\left(\dfrac{4}{7}\right) = 57143$

Problem 2: Share Price now $= \dfrac{\$150{,}000}{4{,}000} = \$37.50$. This is cum-dividend price (i.e. the price with dividend available to share owners).

Ex-dividend Price (i.e. the price per share when a shareowner who buys the share tomorrow, after the ex-dividend date) = $37.50 - $1.25 dividend

$= \$36.25$

Since 4000($1.25) = $5000, the equity and cash account will both decline by $5,000. The balance sheet will look like:

Cash $10,000	$145,000
Fixed assets 135,000	
$145,000	$145,000

Problem 3: Repurchasing the shares will reduce shareholders' equity by $3,000. Therefore, after the repurchase shareholder's equity will become $147,000. Number of shares bought = $\frac{\$3,000}{\$37.50} = 80$

The shares outstanding will become: 4,000 – 80 = 3,920

Therefore, after the repurchase, the share price will equal $\frac{\$147,000}{3920} = \$37.50$ the same as before the repurchase.

Thus with the repurchase you hold a share worth $37.50, and with $1.25 dividend per share you hold a share worth $36.25 plus $1.25 cash dividend. In both cases your wealth is the same.

Problem 4: Share price now (before the stock dividend)

$$= \frac{\$350,000}{10,000} = \$35$$

With 20% stock dividend, the number of new shares outstanding will become 10,000 (1+.20) = 12,000. Therefore the share price to-morrow (when the stock goes ex-dividend) will drop to $\frac{\$350,000}{12,000} = \$29.17$

Problem 5: Remember the word "earnings" means the bottom-line net income, all of which belongs to shareholders, and is therefore "equity" capital. The $420 of the $900 earnings were distributed to shareholders as dividends. Therefore earnings held back (retained earning), available for investment (i.e. for capital outlays) equals: $920 - $420 = $480.

This $480 is equity (E).

We are given $\frac{Debt}{Equity} = \frac{D}{E} = .80$

D = .80 x E

= .80 x \$480

= \$384

The other way calculating D is to do as follows:

$\frac{D}{E} = .80 \Rightarrow \frac{D}{E} = \frac{4}{5} \Rightarrow \frac{D}{D+E} = \frac{4}{9} \Rightarrow \frac{D}{V} = \frac{4}{9}$

Total Capital in V = \$864

Therefore: $D = \frac{D}{V} \times \$864$

$\Rightarrow D = \frac{4}{9} \times \$864$

= \$384.

This method was used in the example in the Binder.

Value of total capital outlay (debt + equity) is called V.

Thus V = D+E

= 384 + \$480

= \$864

Capital structure is defined as $\left[\frac{D}{V}, \frac{E}{V}\right]$

Thus: capital structure is:

$\left[\frac{\$384}{\$864}, \frac{\$480}{\$864}\right]$ or [.4444, .5555]

A useful comment for you: A quick way to calculate $\frac{D}{V}, \frac{E}{V}$. Given: $\frac{D}{E} = .80$ means

$$\frac{D}{E} = \frac{.80}{1} \Rightarrow \frac{D}{D+E} = \frac{.80}{.80+1} = \frac{.80}{1.80} \Rightarrow \frac{D}{V} = \frac{.80}{1.80} \Rightarrow \frac{D}{V} = .4444$$

$$\frac{E}{V} = 1 - .4444 = .5555$$

Problem 6

a. Earnings = \$140,000. This is equity capital we are given:

$$\frac{D}{E} = 3 \Rightarrow \frac{D}{E} = \frac{3}{1} = \frac{D}{\$140,000} = \frac{3}{1} \Rightarrow D = 3 \text{ x } \$140,000 = \$420,000.$$

Since the firm wants no new equital capital (through a stock issue), the maximum equity capital available for investment is \$140,000 so, the maximum amount of capital spending (from both debt and equity sources of capital) equals:

$140,000 + $420,000 = $560,000

(Equity) (Debt)

The other method to calculate the max. amount Budget (V_{max}) is:

$\frac{D}{E} = \frac{3}{1} \Rightarrow \frac{D}{V} = \frac{3}{4} \Rightarrow \frac{E}{V} = \frac{1}{4}$.

Thus $\frac{E}{V}(V_{max}) = \$140,000 \Rightarrow \frac{1}{4}(V_{max}) = 140,000$

$\Rightarrow V_{max} = 140000 \times 4$

$= \$560,000$

b. The planned outlays of capital = $770,000 but the maximum amount available from both debt and equity (consistent with $\frac{D}{E}$ ratio of 3), calculated above, is $560,000. Hence according to the residual dividend policy, no dividend will be paid since nothing will be left over residually. If the firm wants to go ahead with $770,000 outlay for investment, it will have to issue new stock and bonds (debt) (consistent with $\frac{D}{E}$ of 3) to raise ($770,000 - $560,000) or $210,000 additional capital from both sources.

c. No, they do not maintain a constant dividend payout ratio because, with the strict residual policy, the dividend to be given will depend on the firm's investment opportunities and earnings. Because these two things vary, the dividend payout will also vary.

Problem 7

a. Earnings = $45M. This is all equity capital we are given $\frac{D}{E} = 2 \Rightarrow \frac{D}{E} = \frac{2}{1} \Rightarrow D = 2E.$

Hence: D = 2 x $45 = $90 million. Thus the maximum investment funds from both debt and equity (without new equity) $= D + E$

$= \$90M + \$45M = \$135M$

The increase in borrowing is the debt to be raised (according to $\frac{D}{E}$ of 2), calculated above, is $90 million.

b. Planned total capital expenditure V = $60M. $\frac{D}{E} = 2 \Rightarrow \frac{D}{E} = \frac{2}{1} \Rightarrow \frac{D}{D+E} = \frac{2}{2+1} \Rightarrow \frac{D}{V} = \frac{2}{3}.$

Because V = $60M, $\frac{D}{60M} = \frac{2}{3} \Rightarrow D = \frac{2x60M}{3} = 40M.$ Therefore equity portion

= $60M-$40M

= $20M

Since $45M of earnings, (which is equity capital) are predicted and the firm needs to invest only $20M of equity. The ($45M-$20M) or $25M can be given as dividend to 12 million shares which means dividend per share (DPS) = $\frac{\$25M}{12M} = \$2.08$

c. As calculated in part b above, the borrowing (Debt) equals \$40M. The \$20M of earnings used for investment will be added to the firm's retained earnings account on the Balance Sheet.

d. All \$45M earnings will be given as dividends. Dividend earnings per share will equal: $\frac{\$45M}{12M} = \$3.75$. That is zero new borrowing became zero earnings are to be invested. No new borrowings (debt) because no earnings (equity) are used.

Problem 8

Current share price = PV of the dividend per share to be received.

Thus: Current price per share $(P_0) = \frac{\$.60}{1+.15} + \frac{\$30}{(1+.15)^2}$

$= \$23.20605$

If you want equal amounts of dividend per share (DPS) in each of the two years, and because the pattern of dividend payments (firm's dividend policy) does not affect the firm's value, and therefore does not affect share price, we have the following equation:

$$\text{Current price } \$23.20605 = \frac{DPS}{1+.15} + \frac{DPS}{(1+.15)^2}.$$

Solving for DPS, we get DPS = \$14.27442

Now, see the following.

The firm will give you the following dividends on your 1000 shares

Time 0	yr. 1	yr. 2
	\$.60 (1000)	\$30 (1000)
	= \$600	= \$30,000

You want the pattern:

	yr. 1	yr. 2
	\$14.27442 (1000)	\$14.2742 (1000)
	= \$14,274.42	= \$14,274.42
You need	(\$14274.42 - \$600) more	
	= \$13,674.42 more	

You get the pattern you want by selling some of your 1000 shares at year-end 1 at share price P_1 at year-end 1. P_1 = PV of \$30

$$= \frac{\$30}{1+.15} = \$26.08696$$

So, you sell $\frac{\$13,674.2}{\$26.08696} = 524.186$ shares and you will get the \$14274.42 cash at year-end 1.

But by selling 524.186 shares, you will have only (1000 – 524.186) = 475.814 shares left, on which you will get \$30 (475.814) = \$14,274.42 dividend at year-end 2, as you desire.

All these actions on your part constitute "home-made leverage".

Problem 9

(a) *Cash dividend*: $DPS = \frac{\$4,000}{150} = \$26.67$

After this dividend payment, share price will drop to:

(\$35-\$26.67) or \$8.33 per share. Therefore, wealth of a shareholder

= \$26.67 cash dividend plus \$8.33 for each share held

= \$35.

Repurchase: $\frac{\$4,000}{\$35} = 114.29$ shares will be repurchased.

If you choose to have your share repurchased, you will have \$35 cash; if you keep your share, it will still be worth \$35. Here is the proof of it.

The firm's equity value is = \$35 x 150 shares (before repurchase) = \$5,250

After the \$4,000 cash is used to repurchase 114.29 shares, the equity value will decline to: (\$5250 - \$4000) or \$1250. But after the repurchase of 114.29 shares, the number of shares outstanding will decline to (150-114.29) or 35.71. Therefore price per share will be:

$$\frac{\$1250}{35.71} = \$35.$$

So, the share you will keep will be worth \$35.

So, the firm's dividend payment alternative versus shares repurchase alternative will not affect your wealth. It will remain at \$35 per share for each share you will be holding.

(b) Under dividend Payout
EPS will remain at 4.90
P/E = 8.33/.90 = 9.256
Under share Repurchase
EPS = (4.90)(150)/135 = 3.78
P/E = 35/3.78 = 9.259
Because total earnings of 150 x 4.90 and # of shares remain at 150
Thus: P/E ratios are equal
(c) In the real world with cap. gain taxed at lower rate than d.i. dividends, repurchase is better.

Problem 10

This challenging problem will be easy to solve if you recall what you should have learnt from your financial management course ADM 2350, that:

After-tax expected return $= (1-t_d)$ dividend yield $+ (1-t_g)$ capital gain rate on stock

$= (1-t_d)$ dividend yield $+ (1-t_g)g$

t_d = tax rate on dividend income = 35%

t_g = tax rate on capital gain rate represented by g

Gecko pays no dividends, capital gains tax rate $t_g=0$. So: Gecko's after-tax expected return on its stock $= (1-t_d)0 + (1-0)20\%$

$= 20\%$

Gordon has expected dividend yield of 8%, $t_g = 0$. So, Gordon's after-tax expected return on its stock: $= (1-.35)\ 8\% + (1-0\%)g$

$= .65\ (8\%) + g$

$= 5.2\% + g$

Since the problem says that the after-tax expected return on Gecko and Gordon stocks are equal, we have: $20\% = 5.2\% + g \Rightarrow g = 14.8\%$.

Thus the *pre-tax* return on Gordon stock equals: $8\% + 14.8\% = 22.8\%$.