CHAPTER 18
DIVIDENDS AND OTHER PAYOUTS

Answers to Concepts Review and Critical Thinking Questions

1. Dividend policy deals with the timing of dividend payments, not the amounts ultimately paid. Dividend policy is irrelevant when the timing of dividend payments doesn’t affect the present value of all future dividends.

2. A stock repurchase reduces equity while leaving debt unchanged. The debt ratio rises. A firm could, if desired, use excess cash to reduce debt instead. This is a capital structure decision.

3. The chief drawback to a strict dividend policy is the variability in dividend payments. This is a problem because investors tend to want a somewhat predictable cash flow. Also, if there is information content to dividend announcements, then the firm may be inadvertently telling the market that it is expecting a downturn in earnings prospects when it cuts a dividend, when in reality its prospects are very good. In a compromise policy, the firm maintains a relatively constant dividend. It increases dividends only when it expects earnings to remain at a sufficiently high level to pay the larger dividends, and it lowers the dividend only if it absolutely has to.

4. Friday, December 29 is the ex-dividend day. Remember not to count January 1 because it is a holiday, and the exchanges are closed. Anyone who buys the stock before December 29 is entitled to the dividend, assuming they do not sell it again before December 29.

5. No, because the money could be better invested in stocks that pay dividends in cash which benefit the fundholders directly.

6. The change in price is due to the change in dividends, not due to the change in dividend policy. Dividend policy can still be irrelevant without a contradiction.
7. The stock price dropped because of an expected drop in future dividends. Since the stock price is the present value of all future dividend payments, if the expected future dividend payments decrease, then the stock price will decline.

8. The plan will probably have little effect on shareholder wealth. The shareholders can reinvest on their own, and the shareholders must pay the taxes on the dividends either way. However, the shareholders who take the option may benefit at the expense of the ones who don’t (because of the discount). Also as a result of the plan, the firm will be able to raise equity by paying a 10% flotation cost (the discount), which may be a smaller discount than the market flotation costs of a new issue for some companies.

9. If these firms just went public, they probably did so because they were growing and needed the additional capital. Growth firms typically pay very small cash dividends, if they pay a dividend at all. This is because they have numerous projects available, and they reinvest the earnings in the firm instead of paying cash dividends.
10. It would not be irrational to find low-dividend, high-growth stocks. The trust should be indifferent between receiving dividends or capital gains since it does not pay taxes on either one (ignoring possible restrictions on invasion of principal, etc.). It would be irrational, however, to hold municipal bonds. Since the trust does not pay taxes on the interest income it receives, it does not need the tax break associated with the municipal bonds. Therefore, it should prefer to hold higher yield, taxable bonds.

11. The stock price drop on the ex-dividend date should be lower. With taxes, stock prices should drop by the amount of the dividend, less the taxes investors must pay on the dividends. A lower tax rate lowers the investors’ tax liability.

12. With a high tax on dividends and a low tax on capital gains, investors, in general, will prefer capital gains. If the dividend tax rate declines, the attractiveness of dividends increases.

13. Knowing that share price can be expressed as the present value of expected future dividends does not make dividend policy relevant. Under the growing perpetuity model, if overall corporate cash flows are unchanged, then a change in dividend policy only changes the timing of the dividends. The PV of those dividends is the same. This is true because, given that future earnings are held constant, dividend policy simply represents a transfer between current and future stockholders.

In a more realistic context and assuming a finite holding period, the value of the shares should represent the future stock price as well as the dividends. Any cash flow not paid as a dividend will be reflected in the future stock price. As such, the PV of the cash flows will not change with shifts in dividend policy; dividend policy is still irrelevant.

14. The bird-in-the-hand argument is based upon the erroneous assumption that increased dividends make a firm less risky. If capital spending and investment spending are unchanged, the firm’s overall cash flows are not affected by the dividend policy.

15. This argument is theoretically correct. In the real world, with transaction costs of security trading, home-made dividends can be more expensive than dividends directly paid out by the firms. However, the existence of financial intermediaries, such as mutual funds, reduces the transaction costs for individuals greatly. Thus, as a whole, the desire for current income shouldn’t be a major factor favoring high-current-dividend policy.
16.  

a. Cap’s past behavior suggests a preference for capital gains, while Widow Jones exhibits a preference for current income.

b. Cap could show the Widow how to construct homemade dividends through the sale of stock. Of course, Cap will also have to convince her that she lives in an MM world. Remember that homemade dividends can only be constructed under the MM assumptions.

c. Widow Jones may still not invest in Neotech because of the transaction costs involved in constructing homemade dividends. Also, the Widow may desire the uncertainty resolution which comes with high dividend stocks.

17. To minimize her tax burden, your aunt should divest herself of high dividend yield stocks and invest in low dividend yield stock. Or, if possible, she should keep her high dividend stocks, borrow an equivalent amount of money and invest that money in a tax-deferred account.
18. The capital investment needs of small, growing companies are very high. Therefore, payment of dividends could curtail their investment opportunities. Their other option is to issue stock to pay the dividend, thereby incurring issuance costs. In either case, the companies and thus their investors are better off with a zero dividend policy during the firms’ rapid growth phases. This fact makes these firms attractive only to low dividend clienteles.

This example demonstrates that dividend policy is relevant when there are issuance costs. Indeed, it may be relevant whenever the assumptions behind the MM model are not met.

19. Unless there is an unsatisfied high dividend clientele, a firm cannot improve its share price by switching policies. If the market is in equilibrium, the number of people who desire high dividend payout stocks should exactly equal the number of such stocks available. The supplies and demands of each clientele will be exactly met in equilibrium. If the market is not in equilibrium, the supply of high dividend payout stocks may be less than the demand. Only in such a situation could a firm benefit from a policy shift.

20. This finding implies that firms use initial dividends to “signal” their potential growth and positive NPV prospects to the stock market. The initiation of regular cash dividends also serves to convince the market that their high current earnings are not temporary.

Solutions to Questions and Problems

NOTE: All end-of-chapter problems were solved using a spreadsheet. Many problems require multiple steps. Due to space and readability constraints, when these intermediate steps are included in this solutions manual, rounding may appear to have occurred. However, the final answer for each problem is found without rounding during any step in the problem.

Basic

1. The aftertax dividend is the pretax dividend times one minus the tax rate, so:

   Aftertax dividend = $6.00(1 – .15) = $5.10

   The stock price should drop by the aftertax dividend amount, or:

   Ex-dividend price = $90 – 5.10 = $84.90
2.  
a. The shares outstanding increases by 10 percent, so:

New shares outstanding = 10,000(1.10) = 11,000

New shares issued = 1,000

Since the par value of the new shares is ฿1, the capital surplus per share is ฿24. The total capital surplus is therefore:
Capital surplus on new shares = 1,000(฿24) = ฿24,000

<table>
<thead>
<tr>
<th>Common stock (฿1 par value)</th>
<th>฿</th>
<th>11,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital surplus</td>
<td>204,000</td>
<td></td>
</tr>
<tr>
<td>Retained earnings</td>
<td>561,500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>฿776,500</td>
<td></td>
</tr>
</tbody>
</table>

b. The shares outstanding increases by 25 percent, so:

New shares outstanding = 10,000(1.25) = 12,500

New shares issued = 2,500

Since the par value of the new shares is ฿1, the capital surplus per share is ฿24. The total capital surplus is therefore:

Capital surplus on new shares = 2,500(฿24) = ฿60,000

<table>
<thead>
<tr>
<th>Common stock (฿1 par value)</th>
<th>฿</th>
<th>12,500</th>
</tr>
</thead>
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<tr>
<td>Capital surplus</td>
<td>240,000</td>
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<tr>
<td>Retained earnings</td>
<td>524,000</td>
<td></td>
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<tr>
<td></td>
<td>฿776,500</td>
<td></td>
</tr>
</tbody>
</table>

3. a. To find the new shares outstanding, we multiply the current shares outstanding times the ratio of new shares to old shares, so:

New shares outstanding = 10,000(4/1) = 40,000

The equity accounts are unchanged except that the par value of the stock is changed by the ratio of new shares to old shares, so the new par value is:

New par value = ฿1(1/4) = ฿0.25 per share.

b. To find the new shares outstanding, we multiply the current shares outstanding times the ratio of new shares to old shares, so:

New shares outstanding = 10,000(1/4) = 2,500.
The equity accounts are unchanged except that the par value of the stock is changed by the ratio of new shares to old shares, so the new par value is:

New par value = $1(4/1) = $4.00 per share.
4. To find the new stock price, we multiply the current stock price by the ratio of old shares to new shares, so:

   a. $65 \times \frac{3}{5} = 39.00$
   
   b. $65 \times \frac{1}{1.20} = 54.17$
   
   c. $65 \times \frac{1}{1.425} = 45.61$
   
   d. $65 \times \frac{7}{3} = 151.67$

   e. To find the new shares outstanding, we multiply the current shares outstanding times the ratio of new shares to old shares, so:

   a: $150,000 \times \frac{5}{3} = 250,000$
   
   b: $150,000 \times 1.20 = 180,000$
   
   c: $150,000 \times 1.425 = 213,750$
   
   d: $150,000 \times \frac{3}{7} = 64,286$

5. The stock price is the total market value of equity divided by the shares outstanding, so:

   \[ P_0 = \frac{175,000}{10,000} = 17.50 \] per share

   Ignoring tax effects, the stock price will drop by the amount of the dividend, so:

   \[ P_X = 17.50 - 1.50 = 16.00 \]

   The total dividends paid will be:

   \[ 1.50 \text{ per share} \times 10,000 = 15,000 \]

   The equity and cash accounts will both decline by $15,000.

6. Repurchasing the shares will reduce shareholders’ equity by $4,025. The shares repurchased will be the total purchase amount divided by the stock price, so:
Shares bought = $4,025/$17.50 = 230

And the new shares outstanding will be:

New shares outstanding = 10,000 – 230 = 9,770
After repurchase, the new stock price is:

Share price = $170,975/9,770 shares = $17.50

The repurchase is effectively the same as the cash dividend because you either hold a share worth $17.50, or a share worth $16.00 and $1.50 in cash. Therefore, you participate in the repurchase according to the dividend payout percentage; you are unaffected.

7. The stock price is the total market value of equity divided by the shares outstanding, so:

\[ P_0 = \frac{\text{£360,000 equity}}{20,000 \text{ shares}} = \text{£18 per share} \]

The shares outstanding will increase by 25 percent, so:

New shares outstanding = 20,000(1.25) = 25,000

The new stock price is the market value of equity divided by the new shares outstanding, so:

\[ P_X = \frac{\text{£360,000}}{25,000 \text{ shares}} = \text{£14.40} \]

8. With a stock dividend, the shares outstanding will increase by one plus the dividend amount, so:

New shares outstanding = 350,000(1.12) = 392,000

The capital surplus is the capital paid in excess of par value, which is £1, so:

Capital surplus for new shares = 42,000(£19) = £798,000

The new capital surplus will be the old capital surplus plus the additional capital surplus for the new shares, so:

\[ \text{Capital surplus} = £1,650,000 + 798,000 = £2,448,000 \]

The new equity portion of the balance sheet will look like this:
<table>
<thead>
<tr>
<th>Account</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common stock (£1 par value)</td>
<td>£392,000</td>
</tr>
<tr>
<td>Capital surplus</td>
<td>2,448,000</td>
</tr>
<tr>
<td>Retained earnings</td>
<td>2,160,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£5,000,000</strong></td>
</tr>
</tbody>
</table>

9. The only equity account that will be affected is the par value of the stock. The par value will change by the ratio of old shares to new shares, so:

\[
\text{New par value} = £1(1/5) = £0.20 \text{ per share.}
\]
The total dividends paid this year will be the dividend amount times the number of shares outstanding. The company had 350,000 shares outstanding before the split. We must remember to adjust the shares outstanding for the stock split, so:

Total dividends paid this year = £0.70(350,000 shares)(5/1 split) = £1,225,000

The dividends increased by 10 percent, so the total dividends paid last year were:

Last year’s dividends = £1,225,000/1.10 = £1,113,636.36

And to find the dividends per share, we simply divide this amount by the shares outstanding last year. Doing so, we get:

Dividends per share last year = £1,113,636.36/350,000 shares = £3.18

10. The equity portion of capital outlays is the retained earnings. Subtracting dividends from net income, we get:

Equity portion of capital outlays = €1,200 – 450 = €750

Since the debt-equity ratio is .80, we can find the new borrowings for the company by multiplying the equity investment by the debt-equity ratio, so:

New borrowings = .80(€750) = €600

And the total capital outlay will be the sum of the new equity and the new debt, which is:

Total capital outlays = €750 + 600 = €1,350

11. a. The payout ratio is the dividend per share divided by the earnings per share, so:

Payout ratio = QAR0.80/QAR7
Payout ratio = .1143 or 11.43%

b. Under a residual dividend policy, the additions to retained earnings, which is the equity portion of the planned capital outlays, is the retained earnings per share times the number of shares outstanding, so:
Equity portion of capital outlays = 7M shares (QAR7 – .80) = QAR43.4M

This means the total investment outlay will be:

Total investment outlay = QAR43.4M + 18M
Total investment outlay = QAR61.4M
The debt-equity ratio is the new borrowing divided by the new equity, so:

\[
\text{D/E ratio} = \frac{\text{QAR18M}}{\text{QAR43.4M}} = .4147
\]

12. a. Since the company has a debt-equity ratio of 3, they can raise $3 in debt for every $1 of equity. The maximum capital outlay with no outside equity financing is:

\[
\text{Maximum capital outlay} = \$180,000 + 3(\$180,000) = \$720,000.
\]

b. If planned capital spending is $730,000, then no dividend will be paid and new equity will be issued since this exceeds the amount calculated in a.

c. No, they do not maintain a constant dividend payout because, with the strict residual policy, the dividend will depend on the investment opportunities and earnings. As these two things vary, the dividend payout will also vary.

13. a. We can find the new borrowings for the company by multiplying the equity investment by the debt-equity ratio, so we get:

\[
\text{New debt} = 2(\text{kr56M}) = \text{kr112M}
\]

Adding the new retained earnings, we get:

\[
\text{Maximum investment with no outside equity financing} = \text{kr56M} + 2(\text{kr56M}) = \text{kr168M}
\]

b. A debt-equity ratio of 2 implies capital structure is 2/3 debt and 1/3 equity. The equity portion of the planned new investment will be:

\[
\text{Equity portion of investment funds} = \frac{1}{3}(\text{kr72M}) = \text{kr24M}
\]

This is the addition to retained earnings, so the total available for dividend payments is:

\[
\text{Residual} = \text{kr56M} - 24M = \text{kr32M}
\]

This makes the dividend per share:
Dividend per share = kr32M/12M shares = kr2.67

c. The borrowing will be:

$\text{Borrowing} = \text{kr72M} - 24\text{M} = \text{kr48M}$

Alternatively, we could calculate the new borrowing as the weight of debt in the capital structure times the planned capital outlays, so:

$\text{Borrowing} = \frac{2}{3}(\text{kr72M}) = \text{kr48M}$

The addition to retained earnings is kr24M, which we calculated in part b.
d. If the company plans no capital outlays, no new borrowing will take place. The dividend per share will be:

\[
\text{Dividend per share} = \frac{\text{kr}56\text{M}}{12\text{M shares}} = \text{kr}4.67
\]

14. a. If the dividend is declared, the price of the stock will drop on the ex-dividend date by the value of the dividend, $5. It will then trade for $95.

b. If it is not declared, the price will remain at $100.

c. Mann’s outflows for investments are $2,000,000. These outflows occur immediately. One year from now, the firm will realize $1,000,000 in net income and it will pay $500,000 in dividends, but the need for financing is immediate. Mann must finance $2,000,000 through the sale of shares worth $100. It must sell $2,000,000 / $100 = 20,000 shares.

d. The MM model is not realistic since it does not account for taxes, brokerage fees, uncertainty over future cash flows, investors’ preferences, signaling effects, and agency costs.

*Intermediate*

15. The price of the stock today is the PV of the dividends, so:

\[
P_0 = \frac{0.70}{1.15} + \frac{40}{1.15^2} = £30.85
\]

To find the equal two year dividends with the same present value as the price of the stock, we set up the following equation and solve for the dividend (Note: The dividend is a two year annuity, so we could solve with the annuity factor as well):

\[
£30.85 = D/1.15 + D/1.15^2
\]

\[
D = £18.98
\]

We now know the cash flow per share we want each of the next two years. We can find the price of stock in one year, which will be:

\[
P_1 = \frac{40}{1.15} = £34.78
\]
Since you own 1,000 shares, in one year you want:

Cash flow in Year one = 1,000(£18.98) = £18,979.07

But you’ll only get:

Dividends received in one year = 1,000(£0.70) = £700.00
Thus, in one year you will need to sell additional shares in order to increase your cash flow. The number of shares to sell in year one is:

\[
\text{Shares to sell at time one} = \frac{\£18,979.07 - 700}{\£34.78} = 525.52 \text{ shares}
\]

At Year 2, you cash flow will be the dividend payment times the number of shares you still own, so the Year 2 cash flow is:

\[
\text{Year 2 cash flow} = \£40(1,000 - 525.52) = \£18,979.07
\]

**16.** If you only want £200 in Year 1, you will buy:

\[
(\£700 - 200)/\£34.78 = 14.38 \text{ shares}
\]

at Year 1. Your dividend payment in Year 2 will be:

\[
\text{Year 2 dividend} = (1,000 + 14.38)(\£40) = \£40,575
\]

Note that the present value of each cash flow stream is the same. Below we show this by finding the present values as:

\[
\text{PV} = \frac{\£200}{1.15} + \frac{\£40,575}{1.15^2} = \£30,854.44
\]

\[
\text{PV} = 1,000(\£0.70)/1.15 + 1,000(\£40)/1.15^2 = \£30,854.44
\]

**17. a.** If the company makes a dividend payment, we can calculate the wealth of a shareholder as:

Dividend per share = \€5,000/1,000 shares = \€5.00

The stock price after the dividend payment will be:

\[
P_X = \€40 - 5 = \€35 \text{ per share}
\]

The shareholder will have a stock worth €35 and a €5 dividend for a total wealth of €40. If the company makes a repurchase, the company will repurchase:

\[
\text{Shares repurchased} = \frac{\€5,000/\€40}{} = 125 \text{ shares}
\]
If the shareholder lets their shares be repurchased, they will have €40 in cash. If the shareholder keeps their shares, they’re still worth €40.

\[ b. \text{ If the company pays dividends, the current EPS is } €0.95, \text{ and the P/E ratio is:} \]

\[ \text{P/E = } \frac{€35}{€0.95} = 36.84 \]
If the company repurchases stock, the number of shares will decrease. The total net income is the EPS times the current number of shares outstanding. Dividing net income by the new number of shares outstanding, we find the EPS under the repurchase is:

\[
\text{EPS} = \frac{€0.95(1,000)}{(1,000 - 125)} = €1.0857
\]

The stock price will remain at €40 per share, so the P/E ratio is:

\[
\text{P/E} = \frac{€40}{€1.0857} = 36.84
\]

c. A share repurchase would seem to be the preferred course of action. Only those shareholders who wish to sell will do so, giving the shareholder a tax timing option that he or she doesn’t get with a dividend payment.

18. a. Since the firm has a 100 percent payout policy, the entire net income, Rs.32,000 will be paid as a dividend. The current value of the firm is the discounted value one year from now, plus the current income, which is:

\[
\text{Value} = \text{Rs.32,000} + \frac{\text{Rs.1,545,600}}{1.12}
\]

\[
\text{Value} = \text{Rs.1,412,000}
\]

b. The current stock price is the value of the firm, divided by the shares outstanding, which is:

\[
\text{Stock price} = \frac{\text{Rs.1,412,000}}{10,000}
\]

\[
\text{Stock price} = \text{Rs.141.20}
\]

Since the company has a 100 percent payout policy, the current dividend per share will be the company’s net income, divided by the shares outstanding, or:

\[
\text{Current dividend} = \frac{\text{Rs.32,000}}{10,000}
\]

\[
\text{Current dividend} = \text{Rs.3.20}
\]

The stock price will fall by the value of the dividend to:

\[
\text{Ex-dividend stock price} = \text{Rs.141.20} - 3.20
\]

\[
\text{Ex-dividend stock price} = \text{Rs.138.00}
\]
c. i. According to MM, it cannot be true that the low dividend is depressing the price. Since dividend policy is irrelevant, the level of the dividend should not matter. Any funds not distributed as dividends add to the value of the firm, hence the stock price. These directors merely want to change the timing of the dividends (more now, less in the future). As the calculations below indicate, the value of the firm is unchanged by their proposal. Therefore, the share price will be unchanged.
To show this, consider what would happen if the dividend were increased to Rs.4.25. Since only the existing shareholders will get the dividend, the required rupees amount to pay the dividends is:

Total dividends = Rs.4.25(10,000)
Total dividends = Rs.42,500

To fund this dividend payment, the company must raise:

Rupee raised = Required funds – Net income
Rupee raised = Rs.42,500 – 32,000
Rupee raised = Rs.10,500

This money can only be raised with the sale of new equity to maintain the all-equity financing. Since those new shareholders must also earn 12 percent, their share of the firm one year from now is:

New shareholder value in one year = Rs.10,500(1.12)
New shareholder value in one year = Rs.11,760

This means that the old shareholders' interest falls to:

Old shareholder value in one year = Rs.1,545,600 – 11,760
Old shareholder value in one year = Rs.1,533,840

Under this scenario, the current value of the firm is:

Value = Rs.42,500 + Rs.1,533,840/1.12
Value = Rs.1,412,000

Since the firm value is the same as in part i, the change in dividend policy had no effect.

\[ ii. \quad \text{The new shareholders are not entitled to receive the current dividend. They will receive only the value of the equity one year hence. The present value of those flows is:}\]

Present value = Rs.1,533,840/1.12
Present value = Rs.1,369,500

And the current share price will be:

Current share price = Rs.1,369,500/10,000
Current share price = Rs.136.95

So, the number of new shares the company must sell will be:

Shares sold = Rs.10,500/Rs.136.95
Shares sold = 76.67 shares
19.  

   a. The current price is the current cash flow of the company plus the present value of the expected cash flows, divided by the number of shares outstanding. So, the current stock price is:

   \[
   \text{Stock price} = \frac{£1,200,000 + 15,000,000}{1,000,000}
   \]

   \[
   \text{Stock price} = £16.20
   \]

   b. To achieve a zero dividend payout policy, he can invest the dividends back into the company’s stock. The dividends per share will be:

   \[
   \text{Dividends per share} = \frac{[(£1,200,000)(.50)]}{1,000,000}
   \]

   \[
   \text{Dividends per share} = £0.60
   \]

   And the stockholder in question will receive:

   \[
   \text{Dividends paid to shareholder} = £0.60(1,000)
   \]

   \[
   \text{Dividends paid to shareholder} = £600
   \]

   The new stock price after the dividends are paid will be:

   \[
   \text{Ex-dividend stock price} = £16.20 – 0.60
   \]

   \[
   \text{Ex-dividend stock price} = £15.60
   \]

   So, the number of shares the investor will buy is:

   \[
   \text{Number of shares to buy} = \frac{£600}{£15.60}
   \]

   \[
   \text{Number of shares to buy} = 38.46
   \]

20.  

   a. Using the formula from the text proposed by Lintner:

   \[
   \text{Div}_1 = \text{Div}_0 + s(t \cdot \text{EPS}_1 - \text{Div}_0)
   \]

   \[
   \text{Div}_1 = $1.25 + .3[(.4)($4.50) - $1.25]
   \]

   \[
   \text{Div}_1 = $1.415
   \]

   b. Now we use an adjustment rate of 0.50, so the dividend next year will be:

   \[
   \text{Div}_1 = \text{Div}_0 + s(t \cdot \text{EPS}_1 - \text{Div}_0)
   \]

   \[
   \text{Div}_1 = $1.25 + .5[(.4)($4.50) - $1.25]
   \]

   \[
   \text{Div}_1 = $1.525
   \]
c. The lower adjustment factor in part a is more conservative. The lower adjustment factor will always result in a lower future dividend.
**Challenge**

21. Assuming no capital gains tax, the aftertax return for the Gordon Company is the capital gains growth rate, plus the dividend yield times one minus the tax rate. Using the constant growth dividend model, we get:

\[
\text{Aftertax return} = g + D(1 - t) = .15
\]

Solving for \(g\), we get:

\[
.15 = g + .06(1 - .35) \\
g = .1110
\]

The equivalent pretax return for Gecko Company, which pays no dividend, is:

\[
\text{Pretax return} = g + D = .1110 + .06 = 17.10\%
\]

22. Using the equation for the decline in the stock price ex-dividend for each of the tax rate policies, we get:

\[
\frac{P_0 - P_X}{D} = \frac{(1 - T_P)}{(1 - T_G)}
\]

a. \(P_0 - P_X = D(1 - 0)/(1 - 0)\)

\(P_0 - P_X = D\)

b. \(P_0 - P_X = D(1 - .15)/(1 - 0)\)

\(P_0 - P_X = .85D\)

c. \(P_0 - P_X = D(1 - .15)/(1 - .20)\)

\(P_0 - P_X = 1.0625D\)

d. With this tax policy, we simply need to multiply the personal tax rate times one minus the dividend exemption percentage, so:

\[
P_0 - P_X = D[1 - (.35)(.30)]/(1 - .35) \\
P_0 - P_X = 1.3769D
\]
e. Since different investors have widely varying tax rates on ordinary income and capital gains, dividend payments have different after-tax implications for different investors. This differential taxation among investors is one aspect of what we have called the clientele effect.
Since the ₡2,000,000 cash is after corporate tax, the full amount will be invested. So, the value of each alternative is:

**Alternative 1:**
The firm invests in T-bills or in preferred stock, and then pays out as special dividend in 3 years

*If the firm invests in T-Bills:*  
If the firm invests in T-bills, the aftertax yield of the T-bills will be:

Aftertax corporate yield = .07(1 – .35)  
Aftertax corporate yield = .0455 or 4.55%

So, the future value of the corporate investment in T-bills will be:

FV of investment in T-bills = ₡2,000,000(1 + .0455)^3  
FV of investment in T-bills = ₡2,285,609.89

Since the future value will be paid to shareholders as a dividend, the aftertax cash flow will be:

Aftertax cash flow to shareholders = ₡2,285,609.89(1 – .15)  
Aftertax cash flow to shareholders = ₡1,942,768.41

*If the firm invests in preferred stock:*  
If the firm invests in preferred stock, the assumption would be that the dividends received will be reinvested in the same preferred stock. The preferred stock will pay a dividend of:

Preferred dividend = .11(₡2,000,000)  
Preferred dividend = ₡220,000

Since 70 percent of the dividends are excluded from tax:

Taxable preferred dividends = (1 – .70)(₡220,000)  
Taxable preferred dividends = ₡66,000
And the taxes the company must pay on the preferred dividends will be:

Taxes on preferred dividends = .35(₡66,000)
Taxes on preferred dividends = ₡23,100

So, the aftertax dividend for the corporation will be:

Aftertax corporate dividend = ₡220,000 – 23,100
Aftertax corporate dividend = ₡196,900
This means the aftertax corporate dividend yield is:

\[
\text{Aftertax corporate dividend yield} = \frac{₡196,900}{₡2,000,000} \\
\text{Aftertax corporate dividend yield} = .09845 \text{ or } 9.845\
\]

The future value of the company’s investment in preferred stock will be:

\[
\text{FV of investment in preferred stock} = ₡2,000,000(1 + .09845)^3 \\
\text{FV of investment in preferred stock} = ₡2,650,762.85
\]

Since the future value will be paid to shareholders as a dividend, the aftertax cash flow will be:

\[
\text{Aftertax cash flow to shareholders} = ₡2,650,762.85(1 – .15) \\
\text{Aftertax cash flow to shareholders} = ₡2,253,148.42
\]

**Alternative 2:**

The firm pays out dividend now, and individuals invest on their own. The aftertax cash received by shareholders now will be:

\[
\text{Aftertax cash received today} = ₡2,000,000(1 – .15) \\
\text{Aftertax cash received today} = ₡1,700,000
\]

*The individuals invest in Treasury bills:*

If the shareholders invest the current aftertax dividends in Treasury bills, the aftertax individual yield will be:

\[
\text{Aftertax individual yield on T-bills} = .07(1 – .31) \\
\text{Aftertax individual yield on T-bills} = .0483 \text{ or } 4.83\
\]

So, the future value of the individual investment in Treasury bills will be:

\[
\text{FV of investment in T-bills} = ₡1,700,000(1 + .0483)^3 \\
\text{FV of investment in T-bills} = ₡1,958,419.29
\]

*The individuals invest in preferred stock:*
If the individual invests in preferred stock, the assumption would be that the dividends received will be reinvested in the same preferred stock. The preferred stock will pay a dividend of:

Preferred dividend = .11(₡1,700,000)
Preferred dividend = ₡187,000
And the taxes on the preferred dividends will be:

\[
\text{Taxes on preferred dividends} = .31(₡187,000)
\]
\[
\text{Taxes on preferred dividends} = ₡57,970
\]

So, the aftertax preferred dividend will be:

\[
\text{Aftertax preferred dividend} = ₡187,000 - 57,970
\]
\[
\text{Aftertax preferred dividend} = ₡129,030
\]

This means the aftertax individual dividend yield is:

\[
\text{Aftertax corporate dividend yield} = \frac{₡129,030}{₡1,700,000}
\]
\[
\text{Aftertax corporate dividend yield} = .0759 \text{ or } 7.59\%
\]

The future value of the individual investment in preferred stock will be:

\[
\text{FV of investment in preferred stock} = ₡1,700,000(1 + .0759)^3
\]
\[
\text{FV of investment in preferred stock} = 2,117,213.45
\]

The aftertax cash flow for the shareholders is maximized when the firm invests the cash in the preferred stocks and pays a special dividend later.

24. \(a\). Let \(x\) be the ordinary income tax rate. The individual receives an after-tax dividend of:

\[
\text{Aftertax dividend} = €1,000(1 - x)
\]

which she invests in Treasury bonds. The Treasury bond will generate aftertax cash flows to the investor of:

\[
\text{Aftertax cash flow from Treasury bonds} = €1,000(1 - x)[1 + .08(1 - x)]
\]

If the firm invests the money, its proceeds are:

\[
\text{Firm proceeds} = €1,000[1 + .08(1 - .35)]
\]

And the proceeds to the investor when the firm pays a dividend will be:
Proceeds if firm invests first = \((1 - x)(€1,000[1 + .08(1 - .35)])\)
To be indifferent, the investor’s proceeds must be the same whether she invests the after-tax dividend or receives the proceeds from the firm’s investment and pays taxes on that amount. To find the rate at which the investor would be indifferent, we can set the two equations equal, and solve for $x$. Doing so, we find:

\[
\begin{align*}
\varepsilon1,000(1 - x)[1 + .08(1 - x)] &= (1 - x)[\varepsilon1,000[1 + .08(1 - .35)]] \\
1 + .08(1 - x) &= 1 + .08(1 - .35) \\
x &= .35 \text{ or } 35%
\end{align*}
\]

Note that this argument does not depend upon the length of time the investment is held.

\textit{b.} Yes, this is a reasonable answer. She is only indifferent if the after-tax proceeds from the $\varepsilon1,000$ investment in identical securities are identical. That occurs only when the tax rates are identical.

\textit{c.} Since both investors will receive the same pre-tax return, you would expect the same answer as in part a. Yet, because the company enjoys a tax benefit from investing in stock (70 percent of income from stock is exempt from corporate taxes), the tax rate on ordinary income which induces indifference, is much lower. Again, set the two equations equal and solve for $x$:

\[
\begin{align*}
\varepsilon1,000(1 - x)[1 + .12(1 - x)] &= (1 - x)[\varepsilon1,000[1 + .12[.70 + (1 - .70)(1 - .35)]]] \\
1 + .12(1 - x) &= 1 + .12[.70 + (1 - .70)(1 - .35)] \\
x &= .1050 \text{ or } 10.50%
\end{align*}
\]

\textit{d.} It is a compelling argument, but there are legal constraints, which deter firms from investing large sums in stock of other companies.