Answers to Practice Questions

1. Newspaper exercise; answers will vary depending on the stocks chosen.

2. a. Distributes a relatively low proportion of current earnings to offset fluctuations in operational cash flow; lower P/E ratio.
   b. Distributes a relatively high proportion of current earnings since the decline is unexpected; higher P/E ratio.
   c. Distributes a relatively low proportion of current earnings in order to offset anticipated declines in earnings; lower P/E ratio.
   d. Distributes a relatively low proportion of current earnings in order to fund expected growth; higher P/E ratio.

3. a. A $t = 0$ each share is worth $20. This value is based on the expected stream of dividends: $1 at $t = 1$, and increasing by 5% in each subsequent year. Thus, we can find the appropriate discount rate for this company as follows:

$$P_0 = \frac{DIV_1}{r - g}$$

$$20 = \frac{1}{r - 0.05} \implies r = 0.10 = 10.0\%$$

Beginning at $t = 2$, each share in the company will enjoy a perpetual stream of growing dividends: $1.05 at $t = 2$, and increasing by 5% in each subsequent year. Thus, the total value of the shares at $t = 1$ (after the $t = 1$ dividend is paid and after $N$ new shares have been issued) is given by:

$$V_1 = \frac{1.05 \text{ million}}{0.10 - 0.05} = 21 \text{ million}$$

If $P_1$ is the price per share at $t = 1$, then:

$$V_1 = P_1 \times (1,000,000 + N) = 21,000,000$$

and:

$$P_1 \times N = 1,000,000$$
From the first equation:

\[(1,000,000 \times P_1) + (N \times P_1) = $21,000,000\]

Substituting from the second equation:

\[(1,000,000 \times P_1) + $1,000,000 = $21,000,000\]

so that \(P_1 = $20.00\)

b. With \(P_1\) equal to $20, and $1,000,000 to raise, the firm will sell 50,000 new shares.

c. The expected dividends paid at \(t = 2\) are $1,050,000, increasing by 5% in each subsequent year. With 1,050,000 shares outstanding, dividends per share are: $1 at \(t = 2\), increasing by 5% in each subsequent year. Thus, total dividends paid to old shareholders are: $1,000,000 at \(t = 2\), increasing by 5% in each subsequent year.

d. For the current shareholders:

\[
PV(t = 0) = \frac{$2,000,000}{1.10} + \frac{$1,000,000}{(0.10 - 0.05) \times (1.10)} = $20,000,000
\]

4. From Question 3, the fair issue price is $20 per share. If these shares are instead issued at $10 per share, then the new shareholders are getting a bargain, i.e., the new shareholders win and the old shareholders lose.

As pointed out in the text, any increase in cash dividends must be offset by a stock issue if the firm’s investment and borrowing policies are to be held constant. If this stock issue cannot be made at a fair price, then shareholders are clearly not indifferent to dividend policy.

5. a. Since both dividends and capital gains are not taxable, the share price will decrease by the amount of the dividend, HK$5.

b. The share price will not be affected. The value is unaffected by whether the firm issues a dividend or uses the equivalent amount of cash to repurchase stock.
c. The impact on share price depends on investors’ expectations regarding the company’s use of the excess cash. Suppose that investors had expected that the excess cash would have been used for positive NPV investments, and they now learn that, instead, excess cash will be used to repurchase shares in the open market. Since the latter use of cash is a zero NPV investment, stock price will decline upon this announcement. On the other hand, if investors had previously expected that excess cash would be used to pay additional dividends, and they are now informed that, instead, excess cash will be used to repurchase shares, then there will be no affect on share price.

6. Taxes are important in shaping the dividend policy of a private Belgian company, but the remaining factors, such as clientele effects, signaling and agency problems, are not relevant to such a company’s dividend policy. Whether profits are distributed, as dividends or as share repurchases, or retained by the company, is likely to be affected by the manner in which company profits, dividend income and capital gains are taxed in Belgium. However, the other factors are relevant only when company stock is widely held, and shareholders generally do not participate in the management of the company.

7. If the company does not pay a dividend:

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<tr>
<th>Cash</th>
<th>0</th>
<th>0</th>
<th>Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing fixed assets</td>
<td>4,500</td>
<td>5,500 + NPV</td>
<td></td>
</tr>
<tr>
<td>New project</td>
<td>1,000 + NPV</td>
<td></td>
<td>Equity</td>
</tr>
<tr>
<td></td>
<td>$5,500 + NPV</td>
<td>$5,500 + NPV</td>
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If the company pays a $1,000 dividend:

<table>
<thead>
<tr>
<th>Cash</th>
<th>0</th>
<th>0</th>
<th>Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing fixed assets</td>
<td>4,500</td>
<td>1,000</td>
<td>Value of new stock</td>
</tr>
<tr>
<td>New project</td>
<td>1,000 + NPV</td>
<td>4,500 + NPV</td>
<td>Value of original stock</td>
</tr>
<tr>
<td></td>
<td>$5,500 + NPV</td>
<td>$5,500 + NPV</td>
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Because the new stockholders receive stock worth $1,000, the value of the original stock declines by $1,000, which exactly offsets the dividends.
8. One problem with this analysis is that it assumes the company’s net profit remains constant even though the asset base of the company shrinks by 20%. That is, in order to raise the cash necessary to repurchase the shares, the company must sell assets. If the assets sold are representative of the company as a whole, we would expect net profit to decrease by 20% so that earnings per share and the P/E ratio remain the same. After the repurchase, the company will look like this next year:

Net profit: $8 million
Number of shares: 0.8 million
Earnings per share: $10
Price-earnings ratio: 20
Share price: $200

9. The high tax rate on cash dividends apparently resulted in a strong preference among investors for capital gains over cash dividends. However, with the wealth tax, cash dividends, share repurchases, stock dividends, and reinvestment of earnings would theoretically result in essentially the same tax on individual investors because each would increase the investor’s wealth. Consequently, Dutch corporations would be disinclined to adjust their dividend policies based on tax considerations, and might be more likely to base their payout policy on investment opportunities.

10. a. In 2000, investors demonstrated a preference for capital gains by choosing stock dividends over cash dividends. This preference was a result of the high rate of income tax on cash dividends (as high as 60 percent, as noted in Practice Question 9). In 2001, this preference for stock dividends was eliminated by the wealth tax. Both the cash dividend and the reinvestment of earnings (as a consequence of the stock dividend) result in increased wealth and the same dollar-for-dollar tax rate at all income levels. Given the identical impact on an investor’s taxes, a cash dividend is preferable since cash is liquid while a capital gain is less liquid, depending on the stock and the financial markets.

b. It appears that ING wants to make its dividend policy independent of its investment policy. It seems that ING seeks to make its reinvestment decisions and then allow its shareholders to choose whether to receive income in the form of a cash dividend or in the form of capital gains.
11. If markets are efficient, then a share repurchase is a zero-NPV investment. Suppose that the trade-off is between an investment in real assets or a share repurchase. Obviously, the shareholders would prefer a share repurchase to a negative-NPV project. The quoted statement seems to imply that firms have only negative-NPV projects available.

Another possible interpretation is that managers have inside information indicating that the firm’s stock price is too low. In this case, share repurchase is detrimental to those stockholders who sell and beneficial to those who do not. It is difficult to see how this could be beneficial to the firm, however.

12. a. This statement implicitly equates the cost of equity capital with the stock’s dividend yield. If this were true, companies that pay no dividend would have a zero cost of equity capital, which is clearly not correct.

b. One way to think of retained earnings is that, from an economic standpoint, the company earns money on behalf of the shareholders, who then immediately re-invest the earnings in the company. Thus, retained earnings do not represent free capital. Retained earnings carry the full cost of equity capital (although issue costs associated with raising new equity capital are avoided).

c. If the tax on capital gains is less than that on dividends, the conclusion of this statement is correct; i.e., a stock repurchase is always preferred over dividends. This conclusion, however, is strictly because of taxes. Earnings per share is irrelevant.

13. In an imputation tax system, the corporation pays an income tax on its profits, as in the U.S., but, unlike the U.S. system, the payment of dividends provides to shareholders an imputation tax credit equal to the tax paid by the corporation. The shareholder is taxed on income equal to the “grossed up” dividend, i.e., the cash dividend actually received plus the tax paid by the corporation, but the shareholder uses the imputation tax credit against the personal tax liability. If the company pays a 30% tax on corporate profits, then, for tax purposes, a $A7 dividend is treated by the shareholder as income of $A10 with a $A3 imputation tax credit. Any difference between the corporation’s 30% tax rate and the individual’s tax rate results in an extra payment by the taxpayer (for individual rates greater than 30%) or a refund to the taxpayer (for individual rates less than 30%).

In the Australian tax imputation system, high-income investors prefer capital gains while low-income investors prefer cash dividends. In the example above, high-income investors make an extra tax payment if their marginal tax rate is greater than 30%, while low-income investors whose marginal tax rate is less than 30% receive a refund.
Even if the middle-of-the-road party is correct about the supply of dividends, we still do not know why investors wanted the dividends they got. So, it is difficult to be sure about the effect of the tax change. If there is some non-tax advantage to dividends that offsets the apparent tax disadvantage, then we would expect investors to demand more dividends after the government reduces the tax rate on dividends. If the apparent tax disadvantage were irrelevant because there were too many loopholes in the tax system, then the reduction in the tax rate on dividends would not affect the demand for dividends. In any case, the middle-of-the-roaders would argue that once companies adjusted the supply of dividends to the new equilibrium, dividend policy would again become irrelevant.

a. (i) The tax-free investor should buy on the with-dividend date because the dividend is worth $1 and the price decrease is only $0.90.

(ii) The dividend is worth only $0.60 to the taxable investor who is subject to a 40% marginal tax rate. Therefore, this investor should buy on the ex-dividend date.

[Actually, the taxable investor’s problem is a little more complicated. By buying at the ex-dividend price, this investor increases the capital gain that is eventually reported upon the sale of the asset. At most, however, this will cost: $(0.16 \times 0.90) = $0.14$

This is not enough to offset the tax on the dividend.]

b. The marginal investor, by definition, must be indifferent between buying with-dividend or ex-dividend. If we let $T$ represent the marginal tax rate on dividends, then the marginal tax rate on capital gains is $(0.4T)$. In order for the net extra return from buying with-dividend (instead of ex-dividend) to be zero:

$-\text{Extra investment} + \text{After-tax dividend} + \text{Reduction in capital gains tax} = 0$

Therefore, per dollar of dividend:

$-0.85 + [(1 - T) \times 1.00] + [0.4T \times 0.85] = 0$

$T = 0.227 = 22.7\%$

c. We would expect the high-payout stocks to show the largest decline per dollar of dividends paid because these stocks should be held by investors in low, or perhaps even zero, marginal tax brackets.
d. Some investors (e.g., pension funds and security dealers) are indifferent between $1 of dividends and $1 of capital gains. These investors should be prepared to buy any amount of stock with-dividend as long as the fall-off in price is fractionally less than the dividend. Elton and Gruber’s result suggests that there must be some impediment to such tax arbitrage (e.g., transactions costs or IRS restrictions). But, in that case, it is difficult to interpret their result as indicative of marginal tax rates.

e. The tax advantage to capital gains has been reduced. If investors are now indifferent between dividends and capital gains, we would expect that the payment of a $1 dividend would result in a $1 decrease in price.
1. Reducing the amount of earnings retained each year will, of course, reduce the growth rate of dividends. Also, the firm will have to issue new shares each year in order to finance company growth. Under the original dividend policy, we expect next year’s stock price to be: ($50 \times 1.08) = $54. If N is the number of shares previously outstanding, the value of the company at t = 1 is (54N).

Under the new policy, n new shares will be issued at t = 1 to make up for the reduction in retained earnings resulting from the new policy. This decrease is: ($4 - $2) = $2 per original share, or an aggregate reduction of 2N. If P₁ is the price of the common stock at t = 1 under the new policy, then:

\[ 2N = nP₁ \]

Also, because the total value of the company is unchanged:

\[ 54N = (N + n)P₁ \]

Solving, we find that \( P₁ = $52. \)

If g is the expected growth rate under the new policy and \( P₀ \) the price at t = 0, we have:

\[ 52 = (1 + g)P₀ \]

and:

\[ P₀ = \frac{4}{0.12 - g} \]

Substituting the second equation above for \( P₀ \) in the first equation and then solving, we find that \( g = 4\% \) and \( P₀ = $50 \), so that the current stock price is unchanged.
2. Assume that all taxpayers pay a 20% tax on dividend income and 10% tax on capital gains. Firm A pays no dividends but investors expect the price of Firm A stock to increase from $40 to $50 per share. Firm B pays a dividend of $5 per share and investors expect the price of Firm B stock to be $45 next year. Results for Firm A are:

- Before-tax rate of return: $10/$40 = 25.00%
- Tax on dividend at 20%: $0.00
- Tax on capital gains at 10%: 0.10 × $10.00 = $1.00
- Total after-tax income: $0 + $10 - $1 = $9.00
- After-tax rate of return: $9/$40 = 22.50%

The price of Firm B stock today must adjust so as to provide an after-tax return equal to that of Firm A. Let X equal the current price of Firm B stock. Then, for Firm B:

- Next year’s price: $45.00
- Dividend: $5.00
- Today’s stock price: X
- Capital gain: $45 – X
- Before-tax rate of return: ($5 + ($45 – X))/X
- Tax on dividend at 20%: 0.20 × $5.00 = $1.00
- Tax on capital gains at 10%: 0.10 × ($45 – X)
- Total after-tax income: ($5 + ($45 – X)) - $1 - 0.10 × ($45 – X)

The price of Firm B stock adjusts so that the after-tax rate of return for Firm B is equal to 22.5%, the after-tax rate of return for Firm A. To find today’s price for Firm A stock, solve the following for X:

\[
\frac{[$5 + ($45 - X)] - [$1 + 0.10 \times ($45 - X)]}{X} = 0.225 \Rightarrow X = 39.56
\]

3. It is true that researchers have been consistent in finding a positive association between price-earnings multiples and payout ratios. But simple tests like this one do not isolate the effects of dividend policy, so the evidence is not convincing.

Suppose that King Coal Company, which customarily distributes half its earnings, suffers a strike that cuts earnings in half. The setback is regarded as temporary, however, so management maintains the normal dividend. The payout ratio for that year turns out to be 100 percent, not 50 percent.
The temporary earnings drop also affects King Coal’s price-earnings ratio. The stock price may drop because of this year’s disappointing earnings, but it does not drop to one-half its pre-strike value. Investors recognize the strike as temporary, and the ratio of price to this year’s earnings increases. Thus, King Coal’s labor troubles create both a high payout ratio and a high price-earnings ratio. In other words, they create a spurious association between dividend policy and market value. The same thing happens whenever a firm encounters temporary good fortune, or whenever reported earnings underestimate or overestimate the true long-run earnings on which both dividends and stock prices are based.

A second source of error is omission of other factors affecting both the firm’s dividend policy and its market valuation. For example, we know that firms seek to maintain stable dividend rates. Companies whose prospects are uncertain therefore tend to be conservative in their dividend policies. Investors are also likely to be concerned about such uncertainty, so that the stocks of such companies are likely to sell at low multiples. Again, the result is an association between the price of the stock and the payout ratio, but it stems from the common association with risk and not from a market preference for dividends.

Another reason that earnings multiples may be different for high-payout and low-payout stocks is that the two groups may have different growth prospects. Suppose, as has sometimes been suggested, that management is careless in the use of retained earnings but exercises appropriately stringent criteria when spending external funds. Under such circumstances, investors would be correct to value stocks of high-payout firms more highly. But the reason would be that the companies have different investment policies. It would not reflect a preference for high dividends as such, and no company could achieve a lasting improvement in its market value simply by increasing its payout ratio.

4. a. The marginal investors are the institutions.

b. Price of low-payout stock: \[ P_0 = \frac{20}{0.12} = 166.67 \]

Price of medium-payout stock: \[ P_0 = \frac{10}{0.12} = 83.33 \]

Price of high-payout stock: \[ P_0 = \frac{30}{0.12} = 250.00 \]
c. For corporations, after-tax return is 12% for each type of stock.

For individuals, after-tax returns are:

For low-payout stock: \[ \frac{(0.50 \times \$5) + (0.85 \times \$15)}{166.67} = 9.15\% \]

For medium-payout stock: \[ \frac{(0.50 \times \$5) + (0.85 \times \$5)}{83.33} = 8.10\% \]

For high-payout stock: \[ \frac{(0.50 \times \$30) + (0.85 \times \$0)}{250.00} = 6.00\% \]

For corporations, after-tax returns are:

For low-payout stock: \[ \frac{(0.95 \times \$5) + (0.65 \times \$15)}{166.67} = 8.70\% \]

For medium-payout stock: \[ \frac{(0.95 \times \$5) + (0.65 \times \$5)}{83.33} = 9.60\% \]

For high-payout stock: \[ \frac{(0.95 \times \$30) + (0.65 \times \$0)}{250.00} = 11.40\% \]

d. | Payout | Individuals | Corporations | Institutions |
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<tr>
<td>Low</td>
<td>$80 billion</td>
<td>$10 billion</td>
<td>$20 billion</td>
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<tr>
<td>Medium Payout</td>
<td>$50 billion</td>
<td>$110 billion</td>
<td>$50 billion</td>
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<tr>
<td>High Payout</td>
<td>$110 billion</td>
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