Answers to Practice Questions

1. a. \( T_c \) is the corporate tax rate, \( T_p \) is the personal tax rate on interest income and \( T_{pE} \) is the effective personal tax rate on equity income. In the U.K., \( T_c = 30\% \) and \( T_p = 40\% \). \( T_{pE} \) is less than 40\% because the effective capital gains tax rate for the John Peel Group is zero. If, for example, \( T_{pE} = 20\% \), then:

\[
(1 - T_{pE}) \times (1 - T_c) = 0.80 \times 0.70 = 0.56
\]

and:
\[
1 - T_p = 0.60
\]

Here, a lower debt ratio reduces the sum of corporate and personal taxes. If \( T_{pE} = 14.3\% \) then:

\[
(1 - T_{pE}) \times (1 - T_c) = 0.857 \times 0.70 = 0.600
\]

If the effective tax rate on equity income is 14.3\% or higher, then a lower debt ratio reduces the sum of corporate and personal taxes. Since the John Peel Group shareholders are in the top U.K. tax bracket, indicating relatively high income, it seems likely that \( T_{pE} \) is relatively high; the annual allowance of £8,000 is relatively low for high-income taxpayers, so that the bulk of their equity income is in the form of cash dividends.

b. As discussed in Chapter 16, an increase in cash dividend payout, holding capital investment and debt constant, must be financed by issuing new shares; the capital loss to existing shareholders resulting from the new issue exactly offsets the increased cash dividend. For the John Peel Group shareholders, the increased dividend is taxed at 40\% but the capital loss is apparently not tax deductible. Therefore, an increase in cash dividend payout increases the sum of corporate and personal taxes.

The John Peel Group should maintain a low dividend payout ratio and use internally generated funds as its primary source of financing.
2. Consider a firm that is levered, has perpetual expected cash flow $X$, and has an interest rate for debt of $r_D$. The personal and corporate tax rates are $T_p$ and $T_c$, respectively. The cash flow to stockholders each year is:

$$(X - r_D D)(1 - T_c)(1 - T_p)$$

Therefore, the value of the stockholders' position is:

$$V_L = \frac{(X)(1 - T_c)(1 - T_p)}{(r)(1 - T_p)} - \frac{(r_D)(D)(1 - T_c)(1 - T_p)}{(r_D)(1 - T_p)}$$

$$V_L = \frac{(X)(1 - T_c)(1 - T_p)}{(r)(1 - T_p)} - [(D)(1 - T_c)]$$

where $r$ is the opportunity cost of capital for an all-equity-financed firm. If the stockholders borrow $D$ at the same rate $r_D$, and invest in the unlevered firm, their cash flow each year is:

$$[(X)(1 - T_c)(1 - T_p)] - [(r_D)(D)(1 - T_p)]$$

The value of the stockholders' position is then:

$$V_U = \frac{(X)(1 - T_c)(1 - T_p)}{(r)(1 - T_p)} - \frac{(r_D)(D)(1 - T_c)(1 - T_p)}{(r_D)(1 - T_p)}$$

$$V_U = \frac{(X)(1 - T_c)(1 - T_p)}{(r)(1 - T_p)} - D$$

The difference in stockholder wealth, for investment in the same assets, is:

$$V_L - V_U = D T_c$$

This is the change in stockholder wealth predicted by MM.

If individuals could not deduct interest for personal tax purposes, then:

$$V_U = \frac{(X)(1 - T_c)(1 - T_p)}{(r)(1 - T_p)} - \frac{(r_D)(D)}{(r_D)(1 - T_p)}$$

Then:

$$V_L - V_U = \frac{(r_D)(D) - [(r_D)(D)(1 - T_c)(1 - T_p)]}{(r_D)(1 - T_p)}$$

$$V_L - V_U = (D T_c) + \left( D \frac{T_p}{r_D(1 - T_p)} \right)$$

So the value of the shareholders' position in the levered firm is relatively greater when no personal interest deduction is allowed.
3. The book value of Pfizer’s assets is $97,652 million. With a 40 percent book debt ratio:

Long-term debt + Other long-term liabilities = 0.40 \times $97,652 = $39,061 million

This is [$39,061 – ($8,144 + $21,460)] = $9,457 million more than shown in Table 18.3(a). The corporate tax rate is 35 percent, so firm value increases by:

0.35 \times $9,457 = $3,310 million

The market value of the firm is now: ($296,975 + $3,310) = $300,285 million

The market value balance sheet is:

| Net working capital | $10,752 | $17,601 | Long-term debt
| PV interest tax shield | 6,160 | 21,460 | Other long-term liabilities
| Long-term assets | 283,373 | 261,224 | Equity
| Total Assets | $300,285 | $300,285 | Total value

4. Internet exercise; answers will vary depending on the time period.

5. Answers here will vary according to the companies chosen; however, the important considerations are given in the text, Section 18.3.

6. a. SOS stockholders could lose if they invest in the positive NPV project and then SOS becomes bankrupt. Under these conditions, the benefits of the project accrue to the bondholders.

b. If the new project is sufficiently risky, then, even though it has a negative NPV, it might increase stockholder wealth by more than the money invested. This is a result of the fact that, for a very risky investment, undertaken by a firm with a significant risk of default, stockholders benefit if a more favorable outcome is actually realized, while the cost of unfavorable outcomes is borne by bondholders.

c. Again, think of the extreme case: Suppose SOS pays out all of its assets as one lump-sum dividend. Stockholders get all of the assets, and the bondholders are left with nothing.

These conflicts of interest are severe only when the company is in financial distress. Adherence to a moderate target debt ratio limits the conflicts.
7. a. For Project X:
Expected value of cash flows = (160 × 0.05) + (0 × 0.95) = 8 million reals
NPV\(_X\) = −20 + (8/1.15) = −13.04 million reals

For Project Y:
Expected value of cash flows = 30 million reals
NPV\(_Y\) = −20 + (30/1.15) = +6.09 million reals

b. (i) If Bahia rejects both projects X and Y, the 20 million reals in the bank will grow to 23 million reals in one year, so debt holders will receive 23 million reals and equity holders will receive nothing. The present value of the firm’s debt is 20 million reals and the present value of the equity is zero.

(ii) If Bahia accepts project X, the present value of the firm’s assets is the present value of the cash (20 million reals) plus the (negative) NPV of project X, or a total of 6.96 million reals. There is a 0.05 probability that the payoff for project X will be 160 million reals. Therefore, there is a 0.05 probability that the firm’s 80 million real debt will be paid off, leaving 80 million reals as the payoff to equity holders. The value of the firm’s equity is positive, and the value of the firm’s debt is 6.96 million reals less the value of the equity.

(iii) If Bahia accepts project Y, the present value of the firm’s assets is 26.09 million reals. One year from now, the payoff for Project Y will be 30 million reals, so the present value of the equity is zero and the present value of the firm’s debt is 26.09 million reals.

c. If the firm operates strictly in the interest of the shareholders, project X should be accepted since this is the only strategy that produces a positive value for the firm’s equity.

d. For Project Z:
Expected value of cash flows = (140 × 0.05) + (50 × 0.95) = 54.5 million reals
NPV\(_Z\) = −20 + (54.5/1.15) = 27.39 million reals

Both the shareholders and the debtholders regard project Z as preferable to project Y. Debtholders will receive a payoff of at least 50 million reals, with probability 0.95, while shareholders have a probability of 0.05 of receiving a payoff of 60 million reals. In this case, the higher NPV investment (i.e., project Z) is the preferred alternative.
8. a. The bondholders benefit. The fine print limits actions that transfer wealth from the bondholders to the stockholders.

b. The stockholders benefit. In the absence of fine print, bondholders charge a higher rate of interest to ensure that they receive a fair deal. The firm would probably issue the bond with standard restrictions. It is likely that the restrictions would be less costly than the higher interest rate.

9. Other things equal, the announcement of a new stock issue to fund an investment project with an NPV of $40 million should increase equity value by $40 million (less issue costs). But, based on past evidence, management expects equity value to fall by $30 million. There may be several reasons for the discrepancy:

   (i) Investors may have already discounted the proposed investment. (However, this alone would not explain a fall in equity value.)
   (ii) Investors may not be aware of the project at all, but they may believe instead that cash is required because of, say, low levels of operating cash flow.
   (iii) Investors may believe that the firm’s decision to issue equity rather than debt signals management’s belief that the stock is overvalued.

If the stock is indeed overvalued, the stock issue merely brings forward a stock price decline that will occur eventually anyway. Therefore, the fall in value is not an issue cost in the same sense as the underwriter’s spread. If the stock is not overvalued, management needs to consider whether it could release some information to convince investors that its stock is correctly valued, or whether it could finance the project by an issue of debt.

10. a. Masulis’ results are consistent with the view that debt is always preferable because of its tax advantage, but are not consistent with the ‘tradeoff’ theory, which holds that management strikes a balance between the tax advantage of debt and the costs of possible financial distress. In the tradeoff theory, exchange offers would be undertaken to move the firm’s debt level toward the optimum. That ought to be good news, if anything, regardless of whether leverage is increased or decreased.

b. The results are consistent with the evidence regarding the announcement effects on security issues and repurchases.

c. One explanation is that the exchange offers signal management's assessment of the firm's prospects. Management would only be willing to take on more debt if they were quite confident about future cash flow, for example, and would want to decrease debt if they were concerned about the firm’s ability to meet debt payments in the future.
11. a. 

<table>
<thead>
<tr>
<th></th>
<th>Expected Payoff to Bank</th>
<th>Expected Payoff to Ms. Ketchup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project 1</td>
<td>+10.0</td>
<td>+5</td>
</tr>
<tr>
<td>Project 2</td>
<td>(0.4×10) + (0.6×0) = +4.0</td>
<td>(0.4×14) + (0.6×0) = +5.6</td>
</tr>
</tbody>
</table>

Ms. Ketchup would undertake Project 2.

b. Break even will occur when Ms. Ketchup’s expected payoff from Project 2 is equal to her expected payoff from Project 1. If \( X \) is Ms. Ketchup’s payment on the loan, then her payoff from Project 2 is:

\[
0.4 (24 – X)
\]

Setting this expression equal to 5 (Ms. Ketchup’s payoff from Project 1), and solving, we find that: \( X = 11.5 \)

Therefore, Ms. Ketchup will borrow less than the present value of this payment.

12. Internet exercise; answers will vary.

13. Internet exercise; answers will vary.

14. The pecking-order theory would predict fewer public equity issues in emerging countries than in countries with developed financial institutions and greater transparency. In fact, the greater asymmetry with regard to information is likely to result in fewer public companies and more reliance on bank debt. Investors are reluctant to invest in either publicly traded equity or publicly traded debt due to the lack of transparency.

15. Firm value would be unaffected by capital structure because there is no tax advantage to debt with the Australian imputation tax system. Suppose that two firms each have A$100 earnings before interest and taxes, and corporate and individual tax rates equal 30%. One firm has interest expense equal to A$100, so that net income, corporate taxes and dividends are all zero. Bondholders pay A$30 in personal income taxes and their after-tax income is A$70. The second firm has no debt, so that the firm pays A$30 in corporate taxes and distributes A$70 in dividends. With the imputation tax system, shareholders effectively pay the A$30 tax and their after-tax income is A$70. In terms of total corporate and personal income taxes, there is no advantage to debt or equity financing.
Although individuals pay the tax on interest income, and they effectively pay the
tax on equity income, this is not equivalent to valuing a project by pretending that
the corporate tax rate is zero. A particular project has cash flows related to
capital investment and working capital, for example, which result in differential
tax treatments over time. An initial capital investment results in tax deductible
depreciation expense over the life of the asset, and capital gain or loss tax
treatment at the termination of the project. Similarly, inventory purchases are not
tax deductible at the time of acquisition; the expenditure is tax deductible as part
of cost of goods sold when the product is sold. Therefore, taxes affect the timing
of the corporation’s cash flows. Valuation of the project must take this timing
affect into account.
Challenge Questions

1. The right measure in principle is the ratio derived from market-value balance sheets. Book balance sheets represent historical values for debt and equity which can be significantly different from market values. Any changes in capital structure are made at current market values.

The trade-off theory proposes to explain market leverage. Increases or decreases in debt levels take place at market values. For example, a decision to reduce the likelihood of financial distress by retirement of debt means that existing debt is acquired at market value, and that the resulting decrease in interest tax shields is based on the market value of the retired debt. Similarly, a decision to increase interest tax shields by increasing debt requires that new debt be issued at current market prices.

Similarly, the pecking-order theory is based on market values of debt and equity. Internal financing from reinvested earnings is equity financing based on current market values; the alternative to increased internal financing is a distribution of earnings to shareholders. Debt capacity is measured by the current market value of debt because the financial markets view the amount of existing debt as the payment required to pay off that debt.

2. Internet exercise; answers will vary.