

FA Module 13: Deferred taxes assets and liabilities – practice problems

(The attached PDF file has better formatting.)

Recent accounting change for deferred tax assets and liabilities

Question: Are deferred tax assets and liabilities current or non-current assets and liabilities?

Answer: The textbook says that IFRS and GAAP differ:

- IFRS: classifies deferred tax assets and liabilities as non-current assets and liabilities.
- GAAP: classifies deferred tax assets and liabilities based on the classification of the underlying asset or liability. If the deferred tax asset or liability is not related to a specific asset or liability, its classification is based on its expected reversal period.

In 2015, the FASB issued Accounting Standards Update 2015-17, "Balance Sheet Classification of Deferred Taxes," which requires all deferred tax assets and liabilities (and related valuation allowances) to be classified as noncurrent assets and liabilities. GAAP is now like IFRS for classification of deferred tax assets/liabilities.

Deferred taxes: current or non-current?

The textbook says that IFRS reports all deferred taxes as non-current, but GAAP reports them in same classification as the underlying items. This changed in 2015; both IFRS and GAAP now show deferred taxes as non-current. The new GAAP guidance requires that all deferred tax assets and liabilities, along with any related valuation allowance, be classified as noncurrent on the balance sheet.

Paragraph 56 of ASB 101 requires:

When an entity presents current and non-current assets and current and non-current liabilities as separate classifications in its statement of financial position, it shall not classify deferred tax assets (liabilities) as current assets (liabilities).

Regardless of when a deferred tax balance is expected to be settled / extinguished all deferred tax assets and liabilities are shown as non-current.

Deferred tax assets and liabilities are not discounted for the time value of money.

Computing deferred tax assets and liabilities

Deferred tax assets and liabilities can be computed three ways:

- *Income statement method*: the deferred tax asset (loss) for a transaction = the tax rate \times (taxable income – financial statement pre-tax income).
- *Balance sheet method*: the deferred tax asset (loss) for a transaction = the tax rate \times (tax basis – financial statement carrying value).
- *Reversal method*: the deferred tax asset (loss) for a transaction = the additional taxes that would be paid or refunded if the underlying asset or liability were sold or redeemed at its carrying value.

The textbook uses the balance sheet method for computing deferred tax assets and liabilities; it says (p672):

- IFRS and US GAAP both prescribe the balance sheet liability method for recognition of deferred taxes.
- Temporary differences arise from a difference between the tax base and the carrying amount of assets and liabilities.

The income statement method was once used for GAAP, and it is easier to understand than the balance sheet method, but it is complicated by the difference between pre-tax income and other comprehensive income.

The reversal method is simple, but it does not apply to all deferred tax assets and liabilities. We use it for unrealized capital gains and losses on common stock.

The balance sheet method is hard to follow, and the practice problems here use the simpler income statement method. The income statement method includes both pre-tax income and other comprehensive income. Some income does not flow through the income statement, but it still affects deferred tax assets and liabilities.

Exercise 13.1: Subscriptions

A firm begins the year with 300 of shareholders' equity and 300 of cash.

The firm sells 100 annual magazine subscriptions evenly through year. The sales price is 30 per subscription. The firm collects the full annual cost when the subscription is sold.

The firm incurs costs of 1 per month for each subscription:

- half are production costs
- half are general, sales, and administrative expenses

These costs are incurred when the subscription is sold and the firm does not defer any of these costs.

The tax rate is 20%, and all money received is included in taxable income. The firm pays its taxes when they are due. Deferred tax assets and liabilities are non-current assets and liabilities.

- What is deferred revenue at year-end?
- What is net revenue for the year?
- What is the gross profit margin?
- What is the current tax asset or liability at year-end?
- What is the deferred tax asset or liability at year-end?
- What are the operating expenses incurred during the year?
- What is the current ratio at year-end?

Part A: The annual subscriptions are sold evenly through the year. At year-end, half the revenue is earned and half is deferred. The deferred revenue is $\frac{1}{2} \times 100 \times 30 = 1,500$.

Part B: The net revenue is the earned portion of the revenue: $\frac{1}{2} \times 100 \times 30 = 1,500$.

Part C: Cost of goods sold is the production cost. Total costs are 1 per month or 12 per year = one half of the sales price. Half the costs are production costs, so the cost of goods sold is $100 \times 12 \times 1 \times 50\% = 600$.

The gross profit margin = $(1 - 600 / 1,500) = 60\%$.

Question: How would the solution change if the firm deferred part of these expenses?

Answer: For GAAP (and one of the IFRS 17 methods), insurers match acquisition and underwriting expenses to the premiums received. If the firm here also matches expenses to revenue, half of the production costs are deferred, and the gross profit margin is $(1 - 300 / 1,500) = 80\%$.

Part D: The firm pays its taxes when they are due, so the current tax asset or liability is zero.

Part E: The firm pays taxes on the full sales price, but the deferred revenue is not included in financial income. The deferred revenue will be reported next year on the income statement, but no taxes will be paid on it. The deferred tax asset is $1,500 \times 20\% = 300$.

Part F: The operating expenses are $100 \times 12 \times 1 \times 50\% = 600$.

The pre-tax income is net revenue – cost of goods sold – operating expenses = $1,500 - 600 - 600 = 300$.

The tax expense is $20\% \times 300 = 60$.

The tax expenses are $20\% \times \text{pre-tax income} = 20\% \times (1500 - 600 - 600) = 60$. We can also derive this as

- Taxes paid = $20\% \times (3000 - 1,200) = 360$
- Deferred tax asset = 300
- Tax expense = $360 - 300 = 60$

Part G: The firm begins with cash of 300.

It collects cash of 3,000 during the year and pays operating expenses of 1,200 and tax expenses of 360. Its current liabilities are 1,500 of deferred revenue.

$$\text{Its current ratio is } (300 + 3,000 - 1,200 - 360) / 1,500 = 1.1600$$

If the deferred tax asset were classified as a current asset, the current ratio would be

$$(300 + 3,000 - 1,200 - 360 + 300) / 1,500 = 1.3600$$

Question: Are deferred tax assets and liabilities current assets and liabilities or non-current assets and liabilities?

Answer: The textbook says they are non-current assets and liabilities under IFRS, but under GAAP, they are classified the same as the underlying assets and liabilities. In this illustration, since the deferred revenue is a current liability, the related deferred tax asset is a current asset. The examples in the textbook are not clear: sometimes deferred tax assets or liabilities are current and sometimes non-current, and the underlying assets and liabilities are not shown. These examples are from actual financial statements in the United States: some firms show deferred taxes as current and some firms show them as non-current.

GAAP has recently changed the rule so that all deferred tax assets and liabilities are non-current (like IFRS). All firms will report their deferred taxes the same way (as non-current), so financial statements of firms can be compared. This practice problem says that the deferred tax asset is non-current.

Exercise 13.2: Fertilizer

A firm in Argentina begins the year with 300 of shareholders' equity and 300 of cash.

On November 30, the firm receives 600 for a contract to fertilize fields in December, January, and February. The firm buys fertilizer for 300 on credit (90 days net), which it will use evenly over the next three months.

The tax rate is 20%, and all money received or paid is included in taxable income. The firm pays its taxes when they are due, which is when the cash transactions occur.

The firm matches revenue and expenses on its financial statements: both accrue evenly through the year.

- A. What is deferred revenue at year-end?
- B. What is net revenue for the year?
- C. What is the gross profit margin?
- D. What are the taxes paid?
- E. What is the current tax asset or liability at year-end?
- F. What is tax expense on the income statement?
- G. What is the deferred tax asset or liability at year-end?

Part A: The fertilization work is even over the three months, so the accrued revenue is 200 a month and the deferred revenue on December 31 is $2 \times 200 = 400$.

Part B: Net revenue is the gross revenue – the deferred revenue = $600 - 400 = 200$, which is the accrued revenue for December.

Part C: The cost of goods sold (the fertilizer) is half the sales price, so the gross profit margin is 50%.

Part D: In this exercise, taxes are paid when the cash is exchanged. Cash of 600 is collected on November 30, and the 300 for expenses are paid the following year (90 days later). The taxes paid = $600 \times 20\% = 120$.

Part E: Taxes are paid when they are due, so the current tax asset/liability is zero.

Part F: One third of the revenue (one month of three) is earned by year-end, and one third of the expenses accrue by year-end. The pre-tax income = $(600 - 300) / 3 = 100$, and the tax expense = $100 \times 20\% = 20$.

Part G: The change in the deferred tax asset = the taxes paid – the tax expense. In this exercise, the firm has no deferred tax asset or liability from this contract at the beginning of the year (December 31, 20X0), so the deferred tax asset at December 31, 20X1, is $120 - 20 = 100$.

Exercise 13.3: Deferred tax assets and liabilities for depreciation

The tax rate is 20%. A firm uses straight line depreciation for fixed assets. A building bought for 300 on December 31, 20X0, has a ten year estimated useful life for the financial statements and a five year estimated useful life for the tax return.

- A. What is the annual depreciation expense for the building in 20X1, 20X2, and 20X3?
- B. What is the carrying value of the building on December 31, 20X3?
- C. What is the annual tax depreciation for the building in 20X1, 20X2, and 20X3?
- D. What is the tax basis of the building on December 31, 20X3?
- E. What is the change in the deferred tax asset or liability for 20X3?
- F. What is the deferred tax asset or liability on December 31, 20X3?

Part A: The annual depreciation expense for the building in 20X1, 20X2, and 20X3 is $300 / 10 = 30$.

Part B: The carrying value of the building on December 31, 20X3, is the purchase price – accumulated depreciation = $300 - 3 \times 30 = 210$.

Part C: The annual tax depreciation for the building in 20X1, 20X2, and 20X3 is $300 / 5 = 60$.

Part D: The tax basis of the building on December 31, 20X3, is the purchase price – accumulated depreciation on the tax return = $300 - 3 \times 60 = 120$.

Part E: The depreciation expense is an offset to pre-tax income and taxable income. For this building, the

- annual pre-tax income = -30
- annual taxable income = -60

The change in the deferred tax liability = $(-30 - (-60)) \times 20\% = 30 \times 20\% = 6$.

Part F: The deferred tax asset (liability) can be derived two ways:

- Balance sheet approach: $20\% \times (120 - 210) = -18$, or a deferred tax liability of 18.
- Income statement approach: $20\% \times 3 \times (-60 - -30) = -18$.

The deferred tax asset or liability on the balance sheet is cumulative: the sum of the deferred tax revenues or expenses for the current and past years. The deferred tax revenues and expenses are part of the tax expense; they are not shown separately.

Question: The deferred tax asset or liability is the sum of deferred tax revenues or expenses for the current and all past years. How long does it stay on the balance sheet?

Answer: Deferred tax assets and liabilities reverse in future years. A deferred tax asset or liability increases by Z only if it will decrease by Z in a future year. Once the underlying asset or liability leaves the balance sheet, the associated deferred tax asset or liability is zero.

Question: Why does this exercise have a deferred tax liability, not a deferred tax asset?

Answer: The depreciation expense is greater for taxable income (60 *per annum*) than for financial statement pre-tax income (30 *per annum*) in years 1 – 5, so taxable income is less than financial statement pre-tax income and the firm pays less tax in these years than its financial statements would indicate. The depreciation expense becomes zero once the accumulated depreciation equals the purchase price of the asset. In years 6 – 10, the depreciation expense is less for taxable income (0 *per annum*) than for financial statement pre-tax income (30 *per annum*).

- Using financial statement depreciation, the taxes should be the same for all ten years.
- Using tax depreciation, the taxes are greater in years 6 – 10 than in years 1 – 5.

Taxable income moves half the financial statement taxes from years 1 – 5 to year 6 – 10. The firm reports tax expense using financial statement depreciation, and it shows

- tax cash flows for the taxes actually paid
- a liability for the tax expense not yet paid but moved from year 1 – 5 to years 6 – 10.

In years 6 – 10, the tax depreciation is zero, so the taxes paid are higher than would be implied by financial statement depreciation, but the deferred tax liability is taken down. The tax expense from depreciation is the same in years 6 – 10 as in years 1 – 5, despite the difference in the taxes paid.

Balance sheet method vs the income statement method for deferred tax assets and liabilities

Question: The textbook defines the deferred tax asset or liability as (the difference between the tax basis of the asset or liability and the carrying value of the asset or liability) \times the tax rate. The tax expense on the income statement is the current tax payable plus this deferred tax asset or liability. For temporary tax differences, isn't the tax expense simply the pre-tax income times the tax rate, instead of the taxable income times the tax rate?

Answer: Suppose a firm reporting under GAAP buys stock on December 31, 20X1, classified as available for sale, for 400. The stock pays no dividends in 20X2 but appreciates to 500 by December 31, 20X2. The tax basis of the stock remains 400 on December 31, 20X2, and the taxable income is zero.

The unrealized capital gain of 100 in 20X2 is reported as other comprehensive income, not on the income statement itself. The pre-tax income is zero, not 100. But the carrying value of the stock on the balance sheet is now 500, not 400.

The tax expense on the income statement is not pre-tax income \times the tax rate = $0 \times$ the tax rate = 0. Rather, the tax exempt is [taxable income + (carrying value – tax basis)] \times the tax rate = $(0 + 100) \times$ the tax rate.

Exercise 13.4: Deferred taxes, depreciation, and amortization

A firm uses straight line depreciation for fixed assets with an estimated useful life of 10 years for its financial statements and 8 years for taxable income.

- Equipment is bought for 400 on December 31, 20X0.
 - The corporate income tax payments (for the entire firm) are 70 in 20X1, 75 in 20X2, and 65 in 20X3.
 - The corporate tax rate is 20%.
- A. What are the accounting entries for purchase of the equipment on December 31, 20X0?
B. What are the accounting entries for depreciation and the associated taxes on December 31, 20X1?
C. What is the deferred tax asset or liability at 12/31/20X1 and 12/31/20X2?
D. What is the tax expense in 20X1 and in 20X2?

On January 1, 20X3, legislation is enacted that reduces the tax rate to 10% for 20X4 and later years.

- E. What is the deferred tax asset or liability at 12/31/20X3?
F. What is the tax expense in 20X3?

Part A: Buying equipment has offsetting entries on the balance sheet. On December 31, 20X0, the firm

- credits (decreases) cash (an asset) 400
- debits (increases) fixed assets (property, plant, and equipment) 400

No entry is made on the income statement, except for purchase expenses that are not capitalized in the asset.

Part B: Depreciation causes three sets of entries:

- Financial statement depreciation
- Taxes related to tax depreciation
- Deferred taxes related to depreciation

Financial statement depreciation with a 10 year estimated useful life

- debits annual depreciation (on the income statement) $400 / 10 = 40$
- credits (reduces) the carrying value of the equipment (on the balance sheet) 40

The decrease in the net carrying value of the equipment is shown as an increase in accumulated depreciation (on GAAP statements), which is a contra-asset (an offset to the gross asset).

Tax depreciation with an 8 year estimated useful life has annual depreciation of $400/8 = 50$. The annual offset to taxable income is 50, and the annual offset to the tax liability is $20\% \times 50 = 10$. The firm

- debits cash (an asset) 10
- credit tax expense on the income statement 10

Deferred taxes stem from the difference between financial depreciation (40) and tax depreciation (50).

- Taxable income is 10 less than financial statement pre-tax income for 8 years.
- For the next 2 years, taxable income is 40 more than financial statement pre-tax income.

The tax difference reverses after 8 years, so the difference is temporary. The firm pays in years 9 and 10 the taxes saved in years 1 – 8, so it credits a deferred tax liability of $20\% \times 10 = 2$ *per annum* in years 1 – 8.

Part C: The deferred taxes on the balance sheet are cumulative accounts.

- The deferred tax liability is zero at December 31, 20X0.
- The firm credits the deferred tax liability 2 at December 31, 20X1, so its value is 2.
- The firm credits the deferred tax liability 2 at December 31, 20X2, so its value is 4.

Question: Once the asset is fully depreciated, what happens?

Answer: At December 31, 20X8, the deferred tax liability is 16. In each of the next two years, taxable income is 40 more than financial statement pre-tax income. In each of these two years, the firm pays 8 of taxes and

- credits tax expense $20\% \times 40 = 8$
- debits (decreases) the deferred tax liability 8

Question: The two entries above do not include cash. The firm has a tax refund for depreciation, shouldn't its cash increase?

Answer: The firm collected the tax refund for depreciation expense in years 1 – 8.

- A deferred tax asset means the firm prepays its tax expense.
- A deferred tax liability means the firm defers its tax expense or collects in advance its tax refund.

Part D: At 12/31/20X0, the deferred tax liability is zero.

- The change in the deferred tax liability from 12/31/20X0 to 12/31/20X1 is $2 - 0 = 2$. The tax expense for 20X1 is the taxes paid + $\Delta(\text{deferred tax liability}) = 70 + 2 = 72$.
- The change in the deferred tax liability from 12/31/20X1 to 12/31/20X2 is $4 - 2 = 2$. The tax expense for 20X2 is the taxes paid + $\Delta(\text{deferred tax liability}) = 75 + 2 = 77$.

Question: If a firm has both deferred tax assets and deferred tax liabilities, does it report a net deferred tax?

Answer: The deferred tax assets and liabilities are separate accounts. Just as firms report separate accounts receivable and accounts payable, they report separate deferred tax assets and deferred tax liabilities.

Part E: The financial statement depreciation (40) and tax depreciation (50) in 20X3 are the same as in 20X2.

Two items affect the deferred tax liability in 20X3:

- The tax rate will be 10% (not 20%) when the deferred tax liability reverses. The difference of 10 between tax depreciation and financial statement depreciation is a $10\% \times 10 = 1$ addition to the liability.
- The deferred tax liability at 12/31/20X2 was based on a tax rate of 20%. The new tax rate for tax years 20X4 and later is half as large, so the deferred tax liability from 12/31/20X2 changes from 4 to 2.

The deferred tax liability at December 31, 20X3 is $\frac{1}{2} \times 4 + 1 = 3$.

Part F: Taxes paid in 20X3 = 65. The tax expense for 20X3 is $65 + \Delta(\text{deferred tax liability}) = 65 + (3 - 4) = 64$.

Question: In 20X3, the firm pays taxes of 65 and adds 1 to the deferred tax liability, so its tax expense for 20X3 should be 66. The reduction of 2 from the deferred tax liability stems from depreciation in 20X1 and 20X2; why does it affect the tax expense for 20X3?

Answer: A comparison with insurance loss reserves is helpful. Suppose an insurer

- Sets up a 200 reserve for a motor accident on July, 20X1.
- Increases the reserve to 300 on July 1, 20X2.
- Pays the claim for 220 on July 1, 20X3.

The effect on pre-tax income is

- 20X1: -200
- 20X2: -100
- 20X3: +80

The loss reserve is an estimate of future payments. A change in the estimate affects the income of the year the change occurs (calendar year accounting), not the year of the accident (accident year accounting) or the year the policy was issued (policy year accounting). The estimate may change from a revised actuarial model, new information about the victim's injuries, or a law change affecting the compensation. (Changed estimates of future payments on incurred claims are discussed in the modules on insurance contracts.)

A deferred tax liability is an estimate of future tax payments stemming from a past event, and a deferred tax liability is an estimate of future tax savings stemming from a past event. The change in the estimate affects pre-tax income in the year the change occurs. Even if the change is for a deferred tax liability stemming from 20X1 or 20X2 activities, the change in pre-tax income and tax expense occurs in 20X3, when the change occurs. We do not restate the financial statements of previous years.

Revaluations of property, plant, and equipment

IFRS revaluations of property, plant, and equipment are discussed in Section 7 (page 680) of the tax chapter. The subject is covered in four practice problems below:

- Gain or loss on sale of fixed assets.
- Revaluations with financial statement depreciation but no taxes.
- Tax depreciation schedule the same as the financial statement depreciation schedule.
- Different depreciation schedules for taxes and financial statements.

Exercise 13.5: Gain or loss on sale of property, plant, and equipment

A firm reporting under IFRS buys a building for 500 on December 31, 20X0, with an estimated useful life of 10 years, straight line depreciation, and a salvage value of zero. The corporate tax rate is zero.

On January 1, 20X2, the firm sells the building for 540.

- A. What is the carrying value of the building on December 31, 20X1?
- B. What is the gain or loss from sale of the building in 20X2?
- C. How does the sale affect net income and retained earnings in 20X2?

Part A: Annual depreciation is $500 / 10 = 50$. The firm

- debits annual depreciation on the income statement 50
- credits the carrying value of the equipment on the balance sheet 50.

The carrying value is the purchase price minus the accumulated depreciation. The accountant may increase the contra-asset “accumulated depreciation” 50, which reduces the carrying value 50.

Part B: The gain is the sales price minus the carrying value = $540 - 450 = 90$.

Part C: The gain or loss on the sale of property, plant, and equipment flows through the income statement:

- Net income increases 90.
- Retained earnings increase 90.

Question: When does the sale of fixed assets affect deferred tax assets and liabilities?

Answer: When a fixed asset is sold, its carrying value and tax basis are zero. Previous deferred tax assets and liabilities are eliminated, so the *change* in the deferred tax asset or liability is the negative of the deferred tax asset or liability at the beginning of the year. The reversal method means:

the deferred tax asset or liability = the tax that would be accrued if the asset were sold for its carrying value.

- If future taxable income would be more than pre-tax income, the firm has a deferred tax liability now.
- If future taxable income would be less than pre-tax income, the firm has a deferred tax asset now.

Illustration: Reversal method

A firm owns a fixed asset on December 31, 20X2, with a carrying value of 100. The tax rate is 20%.

- If the asset has a tax basis of 90 and the firm sells it for the carrying value of 100
 - the firm has taxable income of $100 - 90 = 10$ and it owes tax of $10 \times 20\% = 2 \Rightarrow$
 - the firm has a deferred tax liability of 4 before it sells the asset
 - the deferred tax liability is the tax it owes after it sells the asset for its carrying value
- If the asset has a tax basis of 110 and the firm sells it for the carrying value of 100
 - the firm has taxable income of $100 - 110 = -10$ and it expects a tax refund of $10 \times 20\% = 4 \Rightarrow$
 - the firm has a deferred tax asset of 4 before it sells the asset
 - the deferred tax asset is the tax refund it expects after it sells the asset for its carrying value.

Exercise 13.6: Revaluation of property, plant, and equipment

A firm reporting under IFRS buys a building for 500 on December 31, 20X0, with an estimated useful life of 10 years, straight line depreciation, and a salvage value of zero. The corporate tax rate is zero.

On December 31, 20X2, a revaluation shows a fair value of 540, with a remaining useful life of 9 years. The firm revalues the building at its fair value.

- A. What is the carrying value of the building on December 31, 20X1?
- B. What is the revaluation surplus on December 31, 20X1?
- C. What is net income and retained earnings in 20X1?
- D. What is the carrying value of the building on December 31, 20X2?
- E. What is net income and retained earnings in 20X2?
- F. What is the revaluation surplus on December 31, 20X2?

Part A: The carrying value on December 31, 20X1, is 540. The revaluation sets the new carrying value and depreciation schedule.

Question: Revaluations use fair values; what do you mean by a depreciation schedule?

Answer: Revaluations occur infrequently, since they are expensive. In between revaluations, the firm uses a depreciation schedule. The revaluation in 20X1 sets a new book value for the asset, which is then depreciated over the coming 9 years (or until the next revaluation). IFRS revaluations generally occur at least every five years, but this practice problem does not deal with asset values in later years.

Contrast asset revaluations with common stocks. Market values for common stocks are available every day without cost. Investors revalue their common stocks each day; they have no need for depreciation schedules.

Question: If a firm choose the revaluation model, how often must it revalue its assets?

Answer: Firms revalue assets when “facts and circumstances” indicate that the fair value has changed from its carrying value. IFRS does not specify how often the firm must revalue assets, though it sets a minimum of every five years.

Illustration: If the revalued assets is 540 and annual depreciation is 60, its carrying value after one more year is $540 - 60 = 480$. If the firm believes that the fair value after one year is materially different from 480, it may revalue the asset again.

Part B: The carrying value on December 31, 20X1, right before the revaluation, is 450: the purchase price minus one year of depreciation. The increase in the carrying value from the revaluation = $540 - 450 = 90$, which is the revaluation surplus, a part of shareholders' equity.

Part C: The revaluation does not affect net income, which remains -50 (from the annual depreciation), and it does not affect retained earnings. It affects shareholders' equity, which includes the revaluation surplus.

Part D: On December 31, 20X1, the building has a carrying value of 540 and an estimated useful life of 9 years, so annual depreciation is 60. The carrying value on December 31, 20X2, is $540 - 60 = 480$.

Part E: The gain of 90 from the revaluation on December 31, 20X1, was other comprehensive income; it was included in revaluation surplus, not in net income or retained earnings. The revaluation surplus is moved to retained earnings over the estimated useful life of the fixed asset, or $90 / 9 = 10$ a year. In 20X2:

- Annual depreciation = 60
- Net income = -60
- Change in retained earnings = $-60 + 10 = -50$

Question: What is the intuition for this accounting?

Answer: The firm paid 500 to buy the building on December 31, 20X0. Cash accounting would reduce retained earnings 500 on that day. Accrual accounting reduces retained earnings evenly over the life of the asset.

The revaluation on December 31, 20X1, is an accounting matter that does not affect the firm's cash flows. If we included the revaluation in net income and retained earnings, the firm would show changes in retained earnings of +40 in 20X1 and –60 for the next nine years. If we include the revaluation in other comprehensive income and move the revaluation surplus evenly into retained earnings, retained earnings changes by –50 each year. The revaluation is a direct credit to equity, not a change in retained earnings.

Question: The revaluation affects the balance sheet but not the income statement. Isn't this inconsistent?

Answer: The balance sheet shows the value of the firm. The best estimate of this worth is the market value of assets and liabilities. If these market values exist, we generally use them, as for traded stocks and bonds.

The income statement shows the firm's management of its activities. Fixed assets are not traded. Investors want to know how well the firm uses fixed assets to create income. In theory, fixed assets are depreciated over their useful lives in proportion to their generation of income. Straight line depreciation is a simple proxy for the actual use to generate income.

Question: Before the revaluation, the expected net income from the asset in years 2 – 10 is $-50 \times 9 = -450$. After the revaluation, the net income from the asset in years 2 – 10 is $-60 \times 9 = -540$. Does the increase in the asset's value decrease net income?

Answer: The revaluation reflects the expected greater income from use of the asset. The textbook says

Although upward asset revaluations also generally decrease income (through higher depreciation expense), the increase in the value of the long-lived asset is presumably based on increases in the operating capacity of the asset, which will likely be evidenced in increased future revenues (page 451).

Intuition: A firm buys equipment for 800 that lasts ten years and produces goods that will be sold for 100 each year. The depreciation of the equipment is 80 a year, and the firm's profit is 20 a year. If demand for the goods rises at the end of year 5 and prices double, the goods are sold for 200 in each of the last five years. If the equipment is not revalued, the firm's profits are 120 in each of the last five years. A revaluation at the end of year 5 increases the depreciation in the last five years, bringing income closer to 20 a year, and directly credits shareholders' equity for the effect of the change in demand at the end year 5.

Question: Does a revaluation ever affect net income?

Answer: A downward revaluation first affects revaluation surplus and then affects net income. Revaluation surplus can not be negative.

Illustration: If the carrying value is 450 and the revaluation gives a fair value of 400, the change of –50 flows through the statement of profit or loss (the income statement), since revaluation surplus can not be negative.

If a reduction in fair value from a revaluation follows an increase in fair value from an earlier revaluation, the reduction in fair value first reduces the revaluation surplus and then reduces net income.

Illustration: Suppose an asset using the revaluation model has the following values:

- 12/31/20X0: the purchase price is 500, straight line depreciation, an estimated useful life of 10 years
 - Annual depreciation is $500 / 10 = 50$.
- 12/31/20X1: a revaluation gives a fair value of 540, with a remaining useful life of 9 years.
 - Annual depreciation is $540 / 9 = 60$.

- 12/31/20X0: a new revaluation gives a fair value of 440, with a remaining useful life of 8 years.
 - Annual depreciation is $440 / 8 = 55$.

On 12/31/20X1, before the revaluation, the carrying value is $500 - 50 = 450$. The increase of $540 - 450 = 90$ becomes revaluation surplus, not net income.

On 12/31/20X2, before the new revaluation, the carrying value is $540 - 60 = 480$. The decrease in the carrying value is $540 - 440 = 100$. The revaluation surplus decreases before the new revaluation by $90 / 9 = 10$ to become $90 - 10 = 80$. It decreases from the new revaluation by 80 to become 0, and the remaining $100 - 80 = 20$ is a charge to income.

Exercise 13.7: Revaluation of property, plant, and equipment

A firm reporting under IFRS buys a building for 500 on December 31, 20X0, with an estimated useful life of 10 years, straight line depreciation, and a salvage value of zero. Tax depreciation uses an estimated useful life of 8 years. The corporate tax rate is 20%.

On December 31, 20X2, a revaluation shows a fair value of 540, with a remaining useful life of 9 years. The firm revalues the building at its fair value. The revaluation does not affect taxable income.

Taxes paid by the firm (for all its operations) are 70 in 20X1 and 70 in 20X2.

- A. What is the deferred tax asset or liability on December 31, 20X1?
- B. What is the tax expense in 20X1?
- C. What is the revaluation surplus on December 31, 20X1?
- D. What is the deferred tax asset or liability on December 31, 20X2?
- E. What is the tax expense in 20X1?

Part A: The financial statement depreciation in 20X1 is 50, and the tax depreciation is $500/8 = 62.50$. The firm pays $20\% \times 12.50 = 2.50$ less tax in 20X1 than its income statement would imply, and it pays 20 more tax after 20X8 than its income statement would imply. The firm accrues a deferred tax liability of 2.50 a year for eight years to cover the additional 20 of tax due after 20X8.

Question: Why does the firm pay 20 more tax after 20X8 than its income statement would imply?

Answer: The firm's income statement shows two more years of 50 annual depreciation, giving a tax deduction of $2 \times 50 \times 20\% = 20$. But the tax depreciation ends in 20X8, so taxes paid after 20X8 are not reduced.

Part B: The tax expense = the taxes paid + the change in the deferred tax liability = $70 + 2.50 = 72.50$.

Question: Doesn't depreciation decrease tax expense? Why does depreciation here increase tax expense?

Answer: Depreciation reduces net income, so it reduces the taxes paid and the tax expense compared to no depreciation. This practice problem gives the taxes paid, which are based on a faster depreciation schedule, so financial statement depreciation should give higher taxes based on a slower depreciation schedule. We derive the tax expense as taxes paid + the change in the deferred tax liability.

Part C: The revaluation surplus is the gain or loss from the revaluation minus the tax portion:

$$90 \times (1 - 20\%) = 72.$$

Question: The exercise says that the revaluation does not affect taxes.

Answer: If the firm sold the building on December 31, 20X1, for 540, it would have a pre-tax gain of 90 and an after-tax gain from the sale of $90 \times (1 - 20\%) = 72$. Items in other comprehensive income are net of taxes, so the revaluation surplus is 72.

The textbook (page 681): "The revaluation surplus is reduced by the tax provision associated with the excess of the fair value over the carrying value [before the revaluation]."

Part D: The financial statement depreciation in 20X2 is 60, and the tax depreciation is $500/8 = 62.50$. The firm pays $20\% \times 2.50 = 0.50$ less tax in 20X2 than its income statement would imply, and it pays 24 more tax after 20X8 than its income statement would imply. The firm accrues a deferred tax liability of 0.50 a year for seven more years. Added to the 2.50 deferred tax liability from December 31, 20X1, gives $2.50 + 7 \times 0.50 = 6$.

Question: Why does the firm pay 24 more tax after 20X8 than its income statement would imply?

Answer: The firm's income statement shows two more years of 60 annual depreciation, giving a tax deduction of $2 \times 60 \times 20\% = 24$. But the tax depreciation ends in 20X8, so taxes paid after 20X8 are not reduced.

Question: How does the deferred tax liability of 6 at 20X8 relate to the 24 extra taxes after 20X8?

Answer: The 72 revaluation surplus on December 31, 20X1, is the excess of the revaluation fair value over the carrying value minus the tax offset of 20%: $90 \times (1 - 20\%) = 72$. Over the remaining estimated useful life of the asset, the revaluation surplus is moved to retained earnings: $72 / 9 = 8$ per year in this practice problem.

The 72 is $90 - 18$. The 90 is the extra depreciation over the next nine years: $9 \times (60 - 50) = 90$. The 6 is the extra tax offset to make the deferred tax liability over the first eight years equal to the tax depreciation in the last two years: $6 + 18 = 24$.

Exercise 13.8: Deferred taxes for research and development

A firm spends 800 on basic research in January through December 20X0. The country's tax law requires research costs to be amortized over four years, beginning January 1, 20X1. The corporate tax rate is 20%. The firm pays taxes (on its total operations) of 800 in 20X0 and 750 in 20X1.

- A. What is the firm's pre-tax income in 20X0 from the research and development?
- B. What is the firm's taxable income in 20X0 from the research and development?
- C. What is the firm's deferred tax asset or liability on December 31, 20X0?
- D. What is the firm's deferred tax asset or liability on December 31, 20X1?
- E. What is the firm's tax expense in 20X0?
- F. What is the firm's tax expense in 20X1?

Part A: Research and development is expensed, not capitalized, so pre-tax income is –800.

Question: Isn't some research and development capitalized under IFRS? Isn't research and development for computer systems sometimes capitalized even under GAAP?

Answer: This practice problem refers to basic research, which is expensed.

Part B: Research and development is capitalized, not expensed, for tax purposes, so taxable income is zero.

Part C: Pre-tax income is less than taxable income in 20X0, so the firm pays higher taxes than implied by its income statement in 20X0. Over the next four years, as the research and development is amortized for tax purposes, the firm pays lower taxes than implied by its income statements.

The firm should receive a tax refund of $20\% \times 800 = 160$ based on its 20X0 income statement, but it has a tax liability of $20\% \times 0 = 0$ instead. The firm sets up a deferred tax asset of 160 on December 31, 20X0, which decreases 40 *per annum* over the next four years.

Question: How does the reversal method solve this scenario?

Answer: The carrying value is zero and the tax basis is 800. If the firm sold the asset for its carrying value, the tax loss is 800 and the firm receives a tax refund of $800 \times 20\% = 160$.

Part D: The tax depreciation is $800 / 4 = 200$ a year for 20X1. The financial statement depreciation is zero. The firm reduces the deferred tax asset by $20\% \times 200 = 40$, so it is $160 - 40 = 120$ on 12/31/20X1.

Part E: The tax expense = the taxes paid – the change in the deferred tax asset = $800 - (160) = 640$.

Part F: The tax expense = the taxes paid – the change in the deferred tax asset = $750 - (-40) = 790$.

- When the deferred tax asset is set up, the change in the deferred tax asset is positive, and the tax expense is less than the taxes paid.
- When the deferred tax asset reverses, the change in the deferred tax asset is negative, and the tax expense is more than the taxes paid.

Permanent tax differences do not reverse.

Donations to political groups, lobbying costs, and entertainment expenses might not be treated as business expenses for tax purposes. Tax law says the expense is not deductible (or only partly deductible) from taxable income.

Illustration: A firm spends 100 on lobbying government officials. Financial income decreases 100, but taxable income does not decrease. This difference never reverses, so the tax difference is permanent, not temporary.

Temporary tax differences

- Financial reporting: Payments received in advance of the goods sold or the services provided are deferred from income until the services or goods are provided. Examples are insurance premiums received before the policy term, mortgage interest received in advance, rent received in advance, and magazine subscriptions received before the magazines are delivered.
- Taxable income: the tax authorities cannot easily judge when the services are provided. They know the cash received by a landlord from bank records, but they cannot judge whether the amounts are for this year's rent or for next year's rent.

Illustration: A landlord receives 100 for next year's rent. Financial reporting shows no income this year. Taxable income shows the 100 as income. Next year, financial reporting shows the 100 income, and taxable income does not show the 100, so the difference reverses.

Exercise 13.9: Tax expense with deferred tax assets and liabilities

A firm pays income taxes of 40 in 20X1 and of 60 in 20X2. It reports the deferred tax assets and liabilities for December 31, 20X1, and December 31, 20X2, in the table below.

	<i>Tax Year 20X1</i>	<i>Tax Year 20X2</i>
<i>Taxes paid</i>	40	60
<i>Deferred taxes at</i>	<i>Dec 31, 20X1</i>	<i>Dec 31, 20X2</i>
<i>Current tax asset</i>	2	0
<i>Current tax liability</i>	0	4
<i>Deferred tax asset</i>	14	22
<i>Deferred tax liability</i>	34	18

- What is the change in the current tax asset in 20X2? How does this change affect the relation of taxes paid to tax expense for 20X2?
- What is the change in the current tax liability in 20X2? How does this change affect the relation of taxes paid to tax expense for 20X2?
- What is the change in the deferred tax asset in 20X2? How does this change affect the relation of taxes paid to tax expense for 20X2?
- What is the change in the deferred tax liability in 20X2? How does this change affect the relation of taxes paid to tax expense for 20X2?
- What is the firm's tax expense in 20X2?

Part A: The change in the current tax asset for 20X2 is $0 - 2 = -2$. The firm over-paid its taxes by 2 in 20X1, and it expects a tax refund of 2 on December 31, 20X1. The expected tax refund is an asset like accounts receivable, with several differences:

- The credit risk is close to zero.
 - The political risk is material in some countries, if the government falls and does not pay its debts, but the credit risk excluding political risk is nil.
- The estimation risk can be material.
 - The firm may dispute its tax liability, but the tax authorities may win the dispute.

The current tax asset decreases from 2 at December 31, 20X1, to 0 at December 31, 20X2, implying that the firm collected the tax refund in 20X2. The taxes paid are 60 in 20X2, but these taxes paid are net of the tax refund collected in 20X2. The tax expense for 20X2 is 2 greater than the taxes paid, or $60 + 2 = 62$.

Question: Perhaps the current tax asset decreases to zero because the firm realizes that it will not collect the tax refund (perhaps because it may lose a tax dispute), not because it did collect the tax refund.

Answer: The firm reduced its tax expense by 2 for 20X1 because it expected to collect a tax refund of 2. If it now realizes that it will not collect the tax refund, it should (in theory) raise the tax expense for 20X1 by 2. We do not restate income statements of previous years for changes in estimates during the current year. Rather, we reduce the current year's tax expense by 2. The result on the current year's tax expense is the same whether the firm actually collects the tax refund or realizes that it will not collect the tax refund.

The formula relating tax payments, expenses, assets, and liabilities is

$$\begin{aligned}
 & \text{Taxes paid} \\
 - & \Delta \text{Current tax asset} \\
 + & \Delta \text{Current tax liability}
 \end{aligned}$$

$$\begin{aligned}
& - \Delta \text{Deferred tax asset} \\
& + \Delta \text{Deferred tax liability} \\
& = \text{Tax expense}
\end{aligned}$$

$$\text{or tax expense} = \text{taxes paid} - \Delta(\text{CTA}) + \Delta(\text{CTL}) - \Delta(\text{DTA}) + \Delta(\text{DTL})$$

For the indirect method of forming the cash flow statement, the corresponding formula is

$$\text{taxes paid} = \text{tax expense} + \Delta(\text{CTA}) - \Delta(\text{CTL}) + \Delta(\text{DTA}) - \Delta(\text{DTL})$$

Question: When do we add vs subtract the change in the non-cash asset or liability? A similar formula is

$$\text{Net revenue} = \text{cash collected from consumers} + \Delta(\text{accounts receivable})$$

In the net revenue formula, we add the change in the non-cash asset to the cash flow to derive the income.

Answer: Taxes are an expense; sales are a revenue.

- An increase in an asset (such as accounts receivable) stems from a revenue on the income statement which corresponds to a cash inflow.
- An increase in an liability (such as deferred tax liability) stems from an extending exposures on the income statement which corresponds to a cash outflow.

The general rules are

$$\begin{aligned}
& \text{revenue} = \text{cash inflow} + \Delta(\text{non-cash asset}) - \Delta(\text{non-cash liability}) \\
& \text{expense} = \text{cash outflow} - \Delta(\text{non-cash asset}) + \Delta(\text{non-cash liability})
\end{aligned}$$

Part B: The change in the current tax liability for 20X2 is $4 - 0 = 4$. The firm may have under-paid its taxes by 4 in 20X1, and it expects to pay the additional 4 in 20X3. The current tax liability is like accounts payable.

The current tax liability increases from 0 at December 31, 20X1, to 4 at December 31, 20X2. The taxes paid are 60 in 20X2, so the tax expense is 4 greater than the taxes paid, or $60 + 4 = 64$.

- The change in the current tax liability is added to taxes paid to give the tax expense.
- The change in the current tax asset is subtracted from taxes paid to give the tax expense.

Part C: The change in the deferred tax asset for 20X2 is $22 - 14 = 8$. The deferred tax asset is cumulative and may be held for more than one year before the tax difference reverses.

- The firm may have paid taxes of 14 in 20X1 and of 22 in 20X2 on taxable income that was not yet included in its income statement but would be included the next year: the 14 in 20X2 and the 22 in 20X3.
- The firm may have paid taxes of 14 in 20X1 and of 8 in 20X2 on taxable income that would be included in the 20X3 income statement.

A deferred tax asset is recognized only if it is expected to reverse: the firm expects to owe less tax in a future year that offsets the extra tax paid because of the past transactions.

The deferred tax asset increases from 14 at December 31, 20X1, to 22 at December 31, 20X2. For simplicity, assume the 14 DTA at 12/31/20X1 reverses in 20X2 and the 22 DTA at 12/31/20X2 reverses in 20X3. These two items imply that

- the firm's tax expense is 14 more than the taxes paid in 20X2
- the firm's tax expense is 22 less than the taxes paid in 20X2

The combined effect is tax expense 8 less than the taxes paid in 20X2.

The taxes paid are 60 in 20X2, so the tax expense is 8 less than the taxes paid, or $60 - 8 = 52$.

Part D: The change in the deferred tax liability for 20X2 is $18 - 34 = -16$. The deferred tax liability is cumulative:

- The firm may have earned income in 20X1 for which taxes of 34 would be recognized in 20X2 and earned income in 20X2 for which taxes of 18 would be due in 20X3.
- The firm may have earned income in 20X1 for which taxes of 16 would be recognized in 20X2 and taxes of 18 would be recognized in 20X3.

The deferred tax asset is recognized only if it is expected to reverse: the firm expects to owe more tax in a future year that offsets the tax not yet paid for the past transactions. Almost all deferred tax liabilities will be collected by tax authorities, which generally have the highest priority among creditors. Firms test the deferred tax asset for future reversals; the deferred tax liability is expected to reverse.

The deferred tax liability decreases from 34 at December 31, 20X1, to 18 at December 31, 20X2. Assume the 34 DTL at 12/31/20X1 reverses in 20X2 and the 18 DTL at 12/31/20X2 reverses in 20X3. These two items imply that

- the firm's tax expense is 34 less than the taxes paid in 20X2
- the firm's tax expense is 18 more than the taxes paid in 20X2

The combined effect is tax expense 16 less than the taxes paid in 20X2.

The taxes paid are 60 in 20X2, so the tax expense is 16 less than the taxes paid, or $60 - 16 = 44$.

Question: You say that deferred tax liabilities are expected to reverse. What if the firm becomes bankrupt and can not pay its debts?

Answer: In a bankruptcy, the firm's assets are divided among its creditors. In many countries, tax authorities are paid before any other creditors. Even bankrupt firms rarely escape paying all their past taxes.

Part E: We sum the four changes to derive the tax expense for 20X2:

$$60 - -2 + 4 - 8 + -16 = 42$$

Exercise 13.10: LIFO reserves and deferred taxes

- A firm uses LIFO for its financial statements and FIFO for its taxable income.
 - The LIFO reserve is 24 at 12/31/20X1 and 32 at 12/31/20X2.
 - The corporate income tax payments are 250 in 20X2.
 - The corporate tax rate is 20%.
- A. How does the inventory accounting method (FIFO vs LIFO) affect net income and taxable income?
B. Why did some manufacturers use LIFO inventory accounting methods when inflation was high?
C. What is a LIFO reserve?
D. What is the deferred tax asset or liability at 12/31/20X1 and 12/31/20X2?
E. What is its tax expense in 20X2?

Part A: The effect of the inventory accounting method (FIFO v LIFO) on income depends on (i) whether prices are increasing or decreasing and (ii) whether the number of units bought are increasing or decreasing.

- FIFO accounting (first-in first-out) implies that the beginning inventory and the earlier units bought during the year are the ones sold and the later units bought are kept in the ending inventory.
 - The cost of goods sold depends on the prices of the earlier units bought.
 - The ending inventory depends on the prices of the later units bought.
- LIFO accounting (last-in first-out) implies that the later units bought during the year are the ones sold and the beginning inventory and the earlier units bought are kept in the ending inventory.
 - The cost of goods sold depends on the prices of the later units bought.
 - The ending inventory depends on the prices of the earlier units bought.

For simplicity, this practice problem assumes the number of units bought and sold per month is constant.

- If prices of inventory are rising:
 - The cost of goods sold is greater for LIFO than for FIFO, so
 - net income and taxable income are lower for LIFO than for FIFO.
 - the tax liability is lower for LIFO than for FIFO.
 - The ending inventory is lower for LIFO than for FIFO.
- If prices of inventory are falling:
 - The cost of goods sold is lower for LIFO than for FIFO, so
 - net income and taxable income are greater for LIFO than for FIFO.
 - the tax liability is greater for LIFO than for FIFO.
 - The ending inventory is greater for LIFO than for FIFO.

Firms with large inventories when prices are rising have lower net income and lower taxable income with LIFO accounting. Firms often prefer higher net income and lower taxable income (so lower tax liabilities). If the inventory accounting method must be the same for taxable income and net income, many firms prefer lower taxable income to higher net income, so they choose LIFO accounting.

Illustration: Price changes and LIFO vs FIFO accounting:

A firm begins the year with no inventory.

- The firm buys 120 units evenly during the year and sells 60 units evenly during the year.
- The price per unit is 1 in January, 2 in February, ..., 11 in November, and 12 in December.
- The average sales price during the year is 10, so net revenue = $120 \times 10 = 1,200$.

The cost of goods sold depends on the inventory accounting method.

- FIFO: the 60 units sold were bought in January - June at an average price of 3.5 per unit.
 - cost of goods sold = $60 \times 3.5 = 210$

- ending inventory = $60 \times 9.5 = 570$
- gross profit margin = $1,200 - 210 = 990$
- LIFO: the 60 units sold were bought in July - December at an average price of 9.5 per unit.
 - cost of goods sold = $60 \times 9.5 = 570$
 - ending inventory = $60 \times 3.5 = 210$
 - gross profit margin = $1,200 - 570 = 630$

In this scenario, LIFO shows higher cost of goods sold, lower ending inventory, and lower profit margin, so the firm pays less taxes with LIFO accounting.

Question: Are prices of inventory usually rising or falling?

Answer: When inflation is high, prices of inventory usually rise for traditional manufacturers, such as makers of steel, automobiles, and furniture. Prices of inventory now often decline over time for high-tech firms, since electronic components are getting cheaper and production is becoming more efficient.

Part B: Some manufacturers with rising inventory prices used LIFO accounting to reduce taxes. The textbook focuses on analysis and inter-firm comparisons of GAAP and IFRS financial statements.

To compare firms using different inventory accounting methods, one must convert inventories from LIFO to FIFO or *vice versa*. GAAP presumes that

- FIFO accounting better reflects which units are actually used
- LIFO accounting is used primarily for the tax benefits.

Part C: GAAP requires that firms using LIFO accounting show the extra inventory that would be held if they used FIFO accounting. This difference, called a LIFO reserve, is the FIFO inventory minus the LIFO inventory.

In some countries, firms must use the same inventory accounting method for taxable income as for financial statements. In other countries (as in this practice problem), the inventory accounting method might differ for taxable income vs the income statement.

Suppose taxable income requires FIFO and the firm uses LIFO for its financial statements.

The firm begins operations on January 1, 20X1, and holds 100 units of inventory on December 31, 20X1. The price per unit is 10 in January 20X1 and rises to 20 in December 20X1. Exact accounting for FIFO uses the number of units bought and sold each month, but for simplicity, we assume here that

- Under FIFO, the ending inventory is the last 100 units bought.
- Under LIFO, the ending inventory is the first 100 units bought.

We compare FIFO and LIFO inventory accounting methods:

- The inventory at year-end is higher using FIFO than it is using LIFO.
- The cost of goods sold is lower using FIFO than it is using LIFO.
- Taxable income is higher using FIFO than it is using LIFO.

If the firm uses FIFO for taxable income and LIFO for financial statements, the tax liability is higher using tax accounting than using financial accounting.

Eventually all inventory is sold or discarded, so the difference between taxable income and financial income is temporary. The taxes paid are temporarily higher than tax expense, and the firm has a deferred tax asset for the difference.

We extend this reasoning to four scenarios:

<i>Prices Rising/Falling</i>	<i>Taxable Income</i>	<i>Financial Income</i>	<i>Deferred Taxes</i>
prices rising	FIFO	LIFO	deferred tax asset
pricing falling	LIFO	FIFO	deferred tax liability
prices rising	LIFO	FIFO	deferred tax liability
pricing falling	FIFO	LIFO	deferred tax asset

Part D: The LIFO reserve = the FIFO inventory – the LIFO inventory. In this practice problem, the pre-tax income on the financial statements uses LIFO and taxable income uses FIFO. This is the reverse of the U.S. manufacturers scenario, where firms chose LIFO for tax purposes.

The positive LIFO reserve means that taxable income will be lower in future years when the ending inventory is sold, so the firm has a deferred tax asset, not a deferred tax liability.

Part E: The change in the LIFO reserve from 20X1 to 20X2 is positive, so

- the inventory increased during the year more for the financial statements
- taxable income is higher than the pre-tax income on the financial statements
- the taxes paid are higher than the tax expense implied by the financial statements

Tax expense = taxes paid + Δ (deferred tax liability) – Δ (deferred tax asset), so the tax expense in 20X2 is

$$250 - (32 - 24) \times 20\% = 248.40$$

Exercise 13.11: Deferred taxes and prepaid expenses

For corporate taxes in Country WW, rent is an expense or a revenue when it is paid, not when it is accrued.

- A firm pays rent of 500 on 12/31/20X1 for January 20X2 and of 600 at 12/31/20X2 for January 20X3.
 - The firm pays corporate income taxes of 850 in 20X2.
 - The corporate tax rate is 20%.
- A. How is the rent payment of 500 on 12/31/20X1 reported on the firm's financial statements?
B. How does this payment affect the firm's 20X1 and 20X2 pre-tax income?
C. How does this payment affect the firm's 20X1 and 20X2 taxable income?
D. What is the deferred tax asset or liability at 12/31/20X1 and at 12/31/20X2?
E. What is the firm's tax expense in 20X2?

Part A: The payment occurs in 20X1, but the rental expense is for 20X2. The firm

- credits cash (an asset) 500
- debits prepaid expenses (an asset) 500

The rental expense accrues over time. If the firm updates its accounts at the end of each month, then on January 31, the firm

- debits rental expense on the income statement 500
- credits prepaid expenses (an asset) 500

In practice, the firm pays rental expense on January 31 for February. The prepaid expense account declines each month (from 500 to 0 in this practice problem) and jumps back to 500 at the end of the month.

Part B: The financial statements use accrual accounting.

- The rent payment on December 31, 20X1, reduces 20X2 pre-tax income, not 20X1 pre-tax income.
- The rent payment on December 31, 20X2, reduces 20X3 pre-tax income, not 20X2 pre-tax income.

Part C: Taxable income in most countries uses accrual accounting as well, with exceptions for some items. The textbook discusses certain deferred revenues, prepaid expenses, and accrued expenses. Tax law differs by country, but you must know how to compute deferred tax assets and liabilities from the data.

In this practice problem, the rent payments affect taxable income of the year when they are paid.

Part D: Suppose this firm begins operations on December 31, 20X1. The corporate tax rate is 20%.

The rent payment of 500 on December 31, 20X1, causes a tax payment of $20\% \times -500 = -100$ in 20X1 that is not recognized as tax expense until 20X2. The firm

- debits cash (an asset) 100
 - tax payments are 100 lower, so cash is 100 higher
- credits deferred tax liability 100
 - the tax reduction for January 20X2 rent is received in 20X1, so the firm accrues a liability of 100 for the tax reduction already received.

If the firm updates its accounts at the end of each month, then on January 31, the firm

- credits tax expense on the income statement 100
- debits deferred tax liability 100

Similarly, the rent payment of 600 on December 31, 20X2, causes a deferred tax liability of 120.

Part E: The tax expense = the taxes paid + the change in the deferred tax liability of $120 - 100 = 20$:

$$850 + 20 = 870.$$

See also the companion practice problem on rental income.

Exercise 13.12: Deferred taxes and deferred revenue

For corporate taxes in Country WW, rent is an expense or a revenue when it is paid, not when it is accrued.

- A firm collects rent of 500 on 12/31/20X1 for January 20X2 and of 600 at 12/31/20X2 for January 20X3.
 - The firm pays corporate income taxes of 850 in 20X2.
 - The corporate tax rate is 20%.
- A. How is the rent received of 500 on 12/31/20X1 reported on the firm's financial statements?
B. How does the rent received affect the firm's 20X1 and 20X2 pre-tax income?
C. How does the rent received affect the firm's 20X1 and 20X2 taxable income?
D. What is the deferred tax asset or liability at 12/31/20X1 and at 12/31/20X2?
E. What is the firm's tax expense in 20X2?

Part A: The rent is received in 20X1, but the rental income is for 20X2. The firm

- debits cash (an asset) 500
- credits deferred revenue (a liability) 500

The rental income accrues over time. If the firm updates its accounts at the end of each month, then on January 31, the firm

- credits rental income on the income statement 500
- debits deferred revenue (a liability) 500

In practice, the firm collects rent on January 31 for February. The deferred revenue account declines each month (from 500 to 0 in this practice problem) and jumps back to 500 at the end of the month.

Part B: The financial statements use accrual accounting.

- The rent received on December 31, 20X1, increases 20X2 pre-tax income, not 20X1 pre-tax income.
- The rent received on December 31, 20X2, increases 20X3 pre-tax income, not 20X2 pre-tax income.

Part C: Taxable income in most countries uses accrual accounting as well, with exceptions for some items. The textbook discusses certain deferred revenues, prepaid expenses, and accrued expenses. Tax law differs by country, but you must know how to compute deferred tax assets and liabilities from the data.

In this practice problem, the rent affects taxable income of the year when it is received.

Part D: Suppose this firm begins operations on December 31, 20X1. The corporate tax rate is 20%.

The rent received of 500 on December 31, 20X1, causes a tax liability of $20\% \times 500 = 100$ in 20X1 that is not recognized as tax expense until 20X2. The firm

- credits cash (an asset) 100
 - tax payments are 100 higher, so cash is 100 lower
- debits deferred tax asset 100
 - the tax for January 20X2 rental income is received in 20X1, so the firm accrues an asset of 100 for the tax already paid.

If the firm updates its accounts at the end of each month, then on January 31, the firm

- debits tax expense on the income statement 100
- credits deferred tax asset 100

Similarly, the rent received of 600 on December 31, 20X2, causes a deferred tax asset of 120.

Part E: The tax expense = the taxes paid – the change in the deferred tax asset of 120 – 100 = 20:

$$850 - 20 = 830.$$

See also the companion practice problem on rent expense.

Exercise 13.13: Deferred taxes and employee wages/benefits

On financial statements, employee salaries, wages, pension benefits, and other post-retirement benefits are expenses when they are accrued, not when they are paid. The difference can be great: pensions begin to accrue when the employee joins the firm, but they are not paid until the employee retires.

In some countries, salaries, wages, pension benefits, and other post-retirement benefits are expenses when they are paid, not when they are accrued. The tax authorities do not allow deductions for wages and benefits until the firm pays them. Some firms become bankrupt and never pay promised pensions.

Accrued pensions is the largest liability on some firms' balance sheets, and the associated deferred tax asset is one of the largest financial assets. Assume that pension payments (not the accrual of pension liabilities) are the offsets to taxable income.

- A firm has a liability for accrued wages of 50 at 12/31/20X1 and of 60 at 12/31/20X2.
- Accrued pension benefits are 800 at 12/31/20X1 and 900 at 12/31/20X2.
- The corporate income tax payments are 750 in 20X2.
- The corporate tax rate is 20%.

- A. What is the expected size of the liability for accrued wages at year-end?
- B. What is the deferred tax asset or liability at 12/31/20X1 and 12/31/20X2?
- C. What is the tax expense in 20X2?

Part A: The expected size of the liability for accrued wages at year-end differs by firm. If the firm pays wages once every two weeks (for the past two weeks work), an average of one week's wages is unpaid at year-end. This wage liability is about 2% of the firm's annual wage expense.

Part B: We compute the deferred tax asset or liability for accrued wages and accrued pensions.

The firm has a wage liability of 50 at December 31, 20X1, and wages are offsets to taxable income when they are paid, not when they are accrued, so the pre-tax income is 50 lower than the taxable income. The firm has a deferred tax asset of $20\% \times 50 = 10$.

The firm has a wage liability of 60 at December 31, 20X2, so the pre-tax income is 60 lower than the taxable income. The firm has a deferred tax asset of $20\% \times 60 = 12$.

The firm has a pension liability of 800 at December 31, 20X1, so the pre-tax income is 800 lower than the taxable income. The firm has a deferred tax asset of $20\% \times 800 = 160$.

The firm has a pension liability of 900 at December 31, 20X2, so the pre-tax income is 900 lower than the taxable income. The firm has a deferred tax asset of $20\% \times 900 = 180$.

Part C: The taxes paid in 20X2 are 750, so the tax expense is

$$750 + (12 - 10) + (180 - 160) = 772$$

Exercise 13.14: Lobbying costs

A firm pays a consultant 100 to lobby for passage of legislation. Lobbying costs are not tax deductible.

- A. What are the accounting entries for the payment to the consultant?
- B. What is the difference between taxable income and financial statement pre-tax income?
- C. What is the deferred tax asset or liability?

Part A: The firm

- debits lobbying expenses 100
- credits cash (an asset) 100

Lobbying expenses are not tax deductible, so no tax entries are made.

Part B: Taxable income does not change from the lobbying expenses. Financial statement pre-tax income declines 100.

Part C: The tax difference does not reverse: the firm will not deduct the 100 from taxable income in a future year. The firm has no deferred tax asset or liability.

Exercise 13.15: Entertainment costs

A consulting firm pays 100 to entertain clients. Only 50% of entertainment expenses are tax deductible. The corporate tax rate is 20%.

- A. What are the accounting entries for the entertainment expenses?
- B. What is the difference between taxable income and financial statement pre-tax income?
- C. What is the deferred tax asset or liability?

Part A: The firm

- debits entertainment expenses 100
- credits cash (an asset) 100

Only 50% of entertainment expenses are tax deductible: $50\% \times 100 \times 20\% = 10$. The firm

- credits tax expense 10
- debits cash (an asset) 10

Part B: Only 50% of entertainment expenses affect taxable income.

- Financial statement pre-tax income declines 100.
- Taxable income declines 50.

Part C: The tax difference does not reverse, so the firm has no deferred tax asset or liability.

Exercise 13.16: Capital gains and deferred taxes

A firm has the following investing transactions, with the market values of the shares:

<i>Dec 31:</i>	<i>Stock Y</i>		<i>Stock Z</i>	
	<i>Market Price</i>	<i>Transaction</i>	<i>Market Price</i>	<i>Transaction</i>
20X0	40	buy 20 shares	60	buy 30 shares
20X1	70	buy 50 shares	20	buy 10 shares
20X2	80	buy 10 shares	10	buy 20 shares
20X3	60	sell 30 shares	50	sell 45 shares

The firm classifies Stock Y as available for sale and Stock Z as held for trading. The capital gains and losses are taxed at 20% when they are realized.

- What are the realized and unrealized capital gains and losses in 20X1?
- What is pre-tax income in 20X1?
- What is other comprehensive income in 20X1?
- What is taxable income in 20X1?
- What is the deferred tax asset or liability on December 31, 20X1?
- What are taxes paid in 20X1?
- What is tax expense in 20X1?
- What are the realized and unrealized capital gains and losses in 20X2?
- What is pre-tax income in 20X2?
- What is other comprehensive income in 20X2?
- What is taxable income in 20X2?
- What is the deferred tax asset or liability on December 31, 20X3?
- What are taxes paid in 20X2?
- What is tax expense in 20X2?
- What are the unrealized capital gains and losses in 20X3 before the sale of stock on 12/31/20X3?
- What are the realized capital gains and losses in 20X3?
- What are the unrealized capital gains and losses in 20X3?
- What is pre-tax income in 20X3?
- What is other comprehensive income in 20X3?
- What is taxable income in 20X3?
- What is the deferred tax asset or liability on December 31, 20X3?
- What are taxes paid in 20X2?
- What is tax expense in 20X2?

Part A: No shares are sold in 20X1, so the realized capital gain or loss is zero.

- The 20 shares of Stock Y bought on December 31, 20X0, increase in market value from 40 to 70 over the year, for an unrealized capital gain of $20 \times (70 - 40) = 600$.
- The 30 shares of Stock Z bought on December 31, 20X0, decrease in market value from 60 to 20 over the year, for an unrealized capital gain of $30 \times (20 - 60) = -1200$ (an unrealized capital loss)

Part B: Stock Z is classified as held for trading, so unrealized capital gains and losses flow through the income statement \Rightarrow pre-tax income in 20X1 = -1200.

Part C: Stock Y is classified as available for sale, so unrealized capital gains and losses do not flow through the income statement \Rightarrow other comprehensive income in 20X1 = +600.

Part D: Capital gains and losses are taxed when realized, so taxable income in 20X1 is zero.

Part E: We can compute the deferred tax assets and liabilities several ways.

Reversal method:

- If Stock Y were sold on December 31, 20X1, the firm would pay taxes of $600 \times 20\% = 120$. The taxes are not yet paid, so the firm has a deferred tax liability of 120.
- If Stock Z were sold on December 31, 20X1, the firm would pay taxes of $-1200 \times 20\% = -240$ (a 240 offset to the tax liability). The taxes are not yet offset, so the firm has a deferred tax asset of 240.

Balance sheet method:

- Stock Y: The carrying value is $20 \times 70 = 1400$ and the tax basis is $20 \times 40 = 800$. The deferred tax liability is $20\% \times (1400 - 800) = 120$.
- Stock Z: The carrying value is $30 \times 20 = 600$ and the tax basis is $30 \times 60 = 1800$. The deferred tax asset is $20\% \times (1800 - 600) = 240$.

Question: Why is the tax basis last year's market price for each stock?

Answer: Taxable income does not include unrealized capital gains and losses, so the tax basis is the purchase price of the stocks (not necessarily last year's market price).

Income statement method:

- Stock Y: Net income + other comprehensive income in 20X1 is +600 and taxable income = 0, so the deferred tax liability = $20\% \times (600 - 0) = 120$.
- Stock Z: Net income + other comprehensive income in 20X1 is -1200 and taxable income = 0, so the deferred tax asset = $20\% \times (1200 - 0) = 240$.

Question: When are the deferred taxes an asset vs a liability, and when are they positive vs negative entries?

Answer: Pre-tax income and other comprehensive income may be positive or negative. Deferred tax assets and liabilities are positive entries; the asset vs liability is the sign of the deferred tax.

- Deferred tax assets increase net income and deferred tax liabilities decrease net income, so one might think of deferred tax assets as positive and deferred tax liabilities as negative.
- Deferred tax assets decrease tax expense and deferred tax liabilities increase tax expense, so one might think of deferred tax assets as negative and deferred tax liabilities as positive.

The income statement method and balance sheet method require memorizing whether to use pre-tax income – taxable income (or carrying value – tax basis) or taxable income – pre-tax income (or tax basis – carrying value) and the signs for deferred tax assets vs deferred tax liabilities. The reversal method is intuitive and reduces errors. Ask yourself: "If the firm sold the stocks on the balance sheet date, what additional tax would it pay (a deferred tax liability) or what additional offset to taxable income would it have (a deferred tax asset)."

Part F: The taxes paid = taxable income \times the tax rate = $0 \times 20\% = 0$.

Part G: Tax expense = taxes paid + Δ (deferred tax liability) – Δ (deferred tax asset) = $0 + 120 - 240 = -120$

Part H: No shares are sold in 20X2, so the realized capital gain or loss is zero.

- The $20 + 50 = 70$ shares of Stock Y held on December 31, 20X2, increased in market value from 70 to 80 over the year, for an unrealized capital gain of $(20 + 50) \times (80 - 70) = 700$
- The $30 + 10 = 40$ shares of Stock Z held on December 31, 20X2, decrease in market value from 20 to 10 over the year, for an unrealized capital gain of $(30 + 10) \times (10 - 20) = -400$ (an unrealized capital loss)

Question: Are the dates for the change in market value the beginning of the year and the end of the year?

Answer: This practice problem is simplified to assume all shares are bought or sold at the end of the year.

- The beginning date is the beginning of the year or the date the shares are bought, whichever is later.
- The ending date is the end of the year or the date the shares are sold, whichever is earlier.

Illustration: If the shares are bought on May 1, 20X1, and still held on December 31, 20X1, the unrealized capital gain is the change in market value from May 1, 20X1, to December 31, 20X1.

Part I: Stock Z is classified as held for trading, so unrealized capital gains and losses flow through the income statement \Rightarrow pre-tax income in 20X1 = -400.

Part J: Stock Y is classified as available for sale, so unrealized capital gains and losses do not flow through the income statement \Rightarrow other comprehensive income in 20X1 = +700.

Part K: Capital gains and losses are taxed when realized, so taxable income in 20X1 is zero.

Part L: We compute the deferred tax assets and liabilities using the reversal method:

- If Stock Y were sold on December 31, 20X2, the firm would pay taxes of $600 \times 20\% + 700 \times 20\% = 260$. The taxes are not yet paid, so the firm has a deferred tax liability of 260.
- If Stock Z were sold on Dec 31, 20X2, the firm would pay taxes of $-1200 \times 20\% + -400 \times 20\% = -320$ (320 offset to the tax liability). The taxes are not yet offset, so the firm has a deferred tax asset of 320.

The deferred tax assets and liabilities are cumulative figures.

Part M: The taxes paid = taxable income \times the tax rate = $0 \times 20\% = 0$.

Part N: Tax expense = taxes paid + Δ (deferred tax liability) - Δ (deferred tax asset)

$$= 0 + (260 - 120) - (320 - 240) = 60$$

Part O: We compute the unrealized capital gains and losses before the sale of stock on 12/31/20X3 and subtract the realized capital gains and losses to arrive at the final unrealized capital gains and losses.

The unrealized capital gains and losses in 20X3 before the sale of stock on 12/31/20X3 are

- Stock Y: $(20 + 50 + 10) \times (60 - 80) = -1600$
- Stock Z: $(30 + 10 + 20) \times (50 - 10) = 2400$

Part P: The realized capital gain or loss depends on the inventory accounting method. Shares of stock have identification numbers on the stock certificate; one buys or sells specific shares. The realized capital gain or loss is the sales price minus the purchase price, which might differ for each share of stock, even if they are sold at the same time, since they may have been bought at different times.

The practice problem does not say which shares of stock are sold. We solve the problem using the first-in first-out inventory accounting method. The last-in first-out method is not used under IFRS, and the weighted average method requires an extra arithmetic step.

- Stock Y: Of the 30 shares sold, 20 were bought on 12/31/20X0 at 40 per share and 10 were bought on 12/31/20X1 at 70 per share. The realized capital gain is $20 \times (60 - 40) + 10 \times (60 - 70) = 300$
- Stock Z: Of the 45 shares sold, 30 were bought on 12/31/20X0 at 60 per share and 15 were bought on 12/31/20X1 at 20 per share. The realized capital gain is $30 \times (50 - 60) + 15 \times (50 - 20) = 150$

Part Q: The unrealized capital gains and losses in 20X3 *after* the sale of stock on 12/31/20X3 =

the unrealized capital gains and losses in 20X3 *before* the sale of stock on 12/31/20X3

– the realized capital gains and losses in 20X3

- Stock Y: $-1600 - 300 = -1900$
- Stock Z: $+2400 - 150 = +2250$

Part R: Pre-tax income = the realized capital gains and losses for all stocks and the unrealized capital gains and losses for stocks classified as held for trading.

- Stock Y: 300
- Stock Z: $150 + 2250 = +2400$

Part S: Other comprehensive income is the unrealized capital gains and losses for stocks classified as available for sale. This is -1900 for Stock Y and 0 for Stock Z.

Part T: Taxable income is the realized capital gain: 300 for Stock Y and 150 for Stock Z.

Part U: The deferred tax asset or liability on December 31, 20X3, is the deferred tax asset or liability on December 31, 20X2, minus the unrealized capital gain or loss in 20X3 times the tax rate:

- Stock Y: $-260 - (-1900) \times 20\% = 120$
- Stock Z: $320 - 2250 \times 20\% = -130$

Part V: The taxes paid in 20X3 are the taxable income \times the tax rate:

- Stock Y: $300 \times 20\% = 60$
- Stock Z: $150 \times 20\% = 30$

Part W: The tax expense in 20X3 is the taxes paid $+$ Δ (deferred tax liability) $-$ Δ (deferred tax asset)

$$= (60 + 30) + (130 - 260) - (120 - 320) = 160$$

Exercise 13.17: Deferred taxes and tax loss carry-forwards

- The corporate tax rate is 20%.
- A firm starts operations on January 1, 20X1, and has negative taxable income of –300 in 20X1.
- In the firm's country, operating losses can be carried forward one year only, after which they expire.

What is the tax expense for 20X1 on the firm's income statement for the following scenarios?

- A. The firm expects taxable income of +500 in 20X2.
- B. The firm expects taxable income of +100 in 20X2.
- C. The firm expects a 50% chance of taxable income of +300 in 20X2 and a 50% chance of taxable income of –100 in 20X2, for expected income of +100 in 20X2.

Part A: The taxes paid in 20X1 are zero. The government does not collect any taxes from the firm, since the taxable income is negative, and it does not pay a tax refund, since the firm has not paid any taxes in the past.

If the firm has taxable income of +500 in 20X2, it can carry forward its tax loss of –300 from 20X1. Its taxable income for 20X2 is +200, and it pays tax of $20\% \times 200 = 40$.

If the firm used cash accounting for its financial statements, the tax expense in 20X1 is zero and the expected tax expense in 20X2 is $100 - 60 = 40$.

- The 100 is the tax liability from 20X2 operations.
- The –60 is the tax refund from the operating loss in 20X1.

Accrual accounting uses accrual dates (transaction dates), not payment dates.

- The operating loss occurs in 20X1: the firm shows tax expense of –60 for 20X1 and a deferred tax asset of 60 at 12/31/20X1.
- The expected operating income in 20X2 is 500, when the firm would show tax expense of $20\% \times 500 = 100$ in 20X2. The taxes paid are 40 and the change in the deferred tax asset is –60, so the tax expense is $40 - (-60) = 100$.

Part B: If the firm expects taxable income of +100 in 20X2, it expects a tax refund from its 20X1 operating loss of 20, so it shows tax expense in 20X1 of –20 and a deferred tax asset of 20 at 12/31/20X1.

Part C: The expected pre-tax income for 20X2 is +100, as in Part B. But the 20X1 tax expense is not the same as in Part B:

- If the firm earns –100 in 20X2, the 20X1 operating loss expires unused and its 20X1 deferred tax asset should have been zero.
- If the firm earns +300 in 20X2, the 20X1 operating loss reduces 20X2 taxes by 60, and its 20X1 deferred tax asset should have been 60.

The tax expense in 20X1 is $\frac{1}{2} \times (0 + -60) = -30$.

Question 13.18: Changes in tax rates

- The corporate tax rate in 20X1 is 25% on both operating income and investment income.
- A firm pays estimated taxes of 200 at the beginning of each quarter in 20X1.
- At the end of the year, it estimates its taxable income is 3,600 for 20X1.
- The firm buys common stocks for 10,000 on 1/1/20X1 and their market value is 9,000 on 12/31/20X1.
- Taxes are paid on capital gains when the gains are realized.

On 7/1/20X1, the government changes the corporate tax rate to 15% for tax years 20X2 and subsequent.

- A. What are the taxes paid on operating income and investment income in 20X1?
- B. What is the current tax asset or liability on December 31, 20X1?
- C. What is the deferred tax asset or liability on December 31, 20X1?
- D. What is the tax expense for 20X1?

Part A: The taxes paid in 20X1 on operating income are $4 \times 200 = 800$. The investment income in 20X1 is an unrealized capital loss, so no taxes are paid or refunded.

Part B: The 20X1 operating income is 3,600, so the tax liability is $20\% \times 3,600 = 720$, so the firm has a current tax asset of $800 - 720 = 80$ (an expected tax refund).

Part C: If the firm sold the stocks, it would have a realized capital loss of $10,000 - 9,000 = 1,000$, and it would have a tax refund of $1,000 \times 15\% = 150$, which gives it a deferred tax asset of 150.

Part D: The general formula is

$$\begin{aligned} & \text{The tax expense} = \text{The taxes paid} \\ & + \Delta(\text{current tax liability}) - \Delta(\text{current tax asset}) \\ & + \Delta(\text{deferred tax liability}) - \Delta(\text{deferred tax asset}) \end{aligned}$$

For this practice problem: $\text{tax expense} = 800 + (100 - 0) + (0 - 150) = 750$.

Question: The tax authorities often have restrictions on tax refunds, which may be collected only if the firm has offsetting tax liabilities. For example, the tax refund on a realized capital loss may be an offset to realized capital gains, but it may not be an offset to operating income.

Answer: If the firm might not collect the tax refund, it posts a valuation allowance as an offset to the deferred tax asset on its GAAP statements. The valuation allowance is an estimate that depends on the portion of the deferred tax asset that it expects to collect and the probability that it will collect. GAAP statements show the full deferred tax asset and a valuation allowance. IFRS statements show only the net deferred tax asset, after reduction for the valuation allowance.

See page 679 of the textbook regarding recognition of a valuation allowance.

Exercise 13.19: Changes in tax rates

The corporate tax rate is 25%. A firm has tax expense of 700 on its 20X1 income statement and the following entries on its December 31, 20X1, balance sheet:

- Current tax asset: 100
- Current tax liability: 200
- Deferred tax asset: 400
- Deferred tax liability: 800

The government changes the corporate tax rate to 20% on December 31, 20X1, for tax years 20X2 and later.

- A. Which of the items above are affected by the change in the corporate tax rate?
- B. What are the firm's revised balance sheet entries at December 31, 20X1?
- C. What is the firm's revised tax expense for 20X1?

Part A: The change in tax rates for future years affects deferred taxes, not current taxes.

- Current tax assets are expected refunds for taxes already paid. Current tax liabilities are for taxes already incurred but not yet paid. Current tax assets and liabilities are not affected by tax law changes that apply to future tax years. The activities have already occurred, so a change in the tax rate for future years does not affect the current year's tax expense.
- Deferred tax assets are for income already reported on financial statements but not included in taxable income until a future year. They use the tax rate for the future year, not the rate for the current year.
- Deferred tax liabilities are for expenses and other deductibles to taxable income that are already reported on financial statements but that will not offset taxable income until a future year. They use the tax rate for the future year, not the rate for the current year.

Part B: A deferred tax asset means the firm has pre-tax income on its financial statements that is more than its taxable income in the current year, but the tax differences reverses in a future year. The change in the corporate tax rate for future years affects the amount of tax that is deferred.

Dividing the deferred tax asset or liability by the current tax rate gives the revenue or expense that is deferred, and then multiplying by the revised tax rate gives the revised deferred tax asset or liability.

- Dividing the 400 deferred tax asset by the 25% current tax rate give the pre-tax income that is deferred for tax purposes: $400 / 25\% = 1600$. Multiplying 1600 by the future tax rate of 20% gives the future tax: $1600 \times 20\% = 320$, which is the revised deferred tax asset.
- Dividing the 800 deferred tax liability by the 25% current tax rate give the expense that is deferred for tax purposes: $800 / 25\% = 3200$. Multiplying 3200 by the future tax rate of 20% gives the future tax deductible: $3200 \times 20\% = 640$, which is the revised deferred tax liability.

We can write this procedure as an algorithm. Let

- r_c = the current tax rate
- r_f = the future tax rate
- dtx = the deferred tax

These variables give

- the underlying revenue or expense = dtx / r_c
- the future tax = $(\text{dtx} / r_c) \times r_f$

We infer that the change in this year's tax expense =

$$(dtx / r_c) \times r_f - dtx = dtx \times [(r_f / r_c) - 1]$$

The deferred tax asset before the change in the tax rate is 400, so the change in the deferred tax asset is

$$400 \times (0.20 / 0.25 - 1) = (80)$$

and the revised deferred tax asset is $400 - 80 = 320$.

The deferred tax liability before the change in the tax rate is 800, so the change in the deferred tax asset is

$$800 \times (0.20 / 0.25 - 1) = (160)$$

and the revised deferred tax liability is $800 - 160 = 640$.

Part C: The tax expense = taxes paid + $\Delta(\text{CTL}) - \Delta(\text{CTA}) + \Delta(\text{DTL}) - \Delta(\text{DTA})$

The change in the future tax rates affects the deferred tax assets and liabilities at the end of 20X1, not the deferred tax assets or liabilities at the beginning of 20X1 or any current tax assets or liabilities. The revised tax expense is

$$700 + (640 - 800) - (320 - 400) = 620$$

IFRS and GAAP difference regarding expected changes in tax rates

Question: If the firm expects the tax rate to be lower next year, but the new legislation is not yet enacted, does it use the current tax rates or the expected future tax rates for deferred tax assets and liabilities?

Answer: The new legislation must be enacted, though IFRS and GAAP differ in some details:

- IFRS requires *substantial* enactment of new tax rate.
- GAAP uses the new tax rate only if it is already enacted.

(See page 689 of the textbook.)

IFRS and GAAP differ with respect to the valuation allowance for deferred tax assets

Question: The solution to this practice problem is the same as the solution to the previous practice problem. But the deferred tax asset didn't change from 12/31/20X1 to 12/31/20X2. Perhaps the deferred tax asset stems from operations in 20X1. Shouldn't a law change cause a restatement of past financial statements, not just a change to the current financial statements?

Answer: Changes to accounting principles that cause material effects on the financial statements may require restatements of past balance sheets and income statements. Tax laws are the firm's estimates. The firm must estimate its tax liability for the current year and any effects on future tax liabilities from current year operations. A change in estimates changes the current financial statements only.

Estimating future tax rates is difficult. To ensure consistency among firms, IFRS and GAAP specify whether the new tax law must be passed during the current fiscal year. The rules differ slightly for IFRS vs GAAP.

- IFRS: A deferred tax asset is recognized if it is probable (more likely than not) that sufficient taxable profit will be available against which the temporary difference can be utilized.
- GAAP: A deferred tax asset is recognized in full, but it is reduced by a valuation allowance if it is more likely than not that some or all of the deferred tax asset will not be realized.

The difference is primarily presentation, not substance.

(See page 689 of the textbook.)

Exercise 13.20: Change in corporate tax rates

A firm begins operations on January 1, 20X2. The firm shows

- tax expense of 500 on its 20X2 income statement,
- a deferred tax asset of 40 and a deferred tax liability of 0 on its December 31, 20X2, balance sheet

A new law passed on December 31, 20X2 changes the corporate tax rate from 20% to 25% for the 20X3 and subsequent tax years.

- A. What is the revised deferred tax asset on December 31, 20X2?
B. What is the revised tax expense for 20X2?

Part A: The deferred tax asset of 40 before the new law is passed means taxable income in 20X3 and later years will be $40/20\% = 200$ less than pre-tax income on the financial statements because of temporary tax differences from 20X2 operations. The new law changes the tax rate, not the taxable income or the pre-tax income, so the new deferred tax asset is $200 \times 25\% = 50$.

Part B: The tax expense = the tax liability + the change in the deferred tax liability – the change in the deferred tax asset. Using the figures on the financial statements:

The tax liability for 20X2 = the tax expense + the change in the deferred tax asset – the change in the deferred tax liability = $500 + 40 - 0 = 540$.

The new law changes the deferred tax asset to 50, so the tax expense changes to $540 + 0 - 50 = 490$.

Question: How would the solution differ if the firm had a deferred tax liability of 40 instead of the deferred tax asset of 40?

Answer: The deferred tax liability would become 50, and the tax expense would become 510.

Question: Shouldn't we use the changes in the deferred tax assets and liabilities?

Answer: The firm begins operations in 20X2, so the deferred tax assets and liabilities are zero at the beginning of the year.

Exercise 13.21: Change in corporate tax rates

A firm shows

- tax expense of 500 on its 20X2 income statement,
- a deferred tax asset of 40 and a deferred tax liability of 0 on both its December 31, 20X1, and December 31, 20X2, balance sheets

A new law passed on December 31, 20X2, changes the corporate tax rate from 20% to 25% for the 20X3 and subsequent tax years.

- A. What is the revised deferred tax asset on December 31, 20X2?
B. What is the revised tax expense for 20X2?

Part A: The deferred tax asset of 20 before the new law is passed means taxable income in 20X3 and later years will be $40/20\% = 200$ less than pre-tax income on the financial statements because of temporary tax differences from 20X2 operations. The new law changes the tax rate, not the taxable income or the pre-tax income, so the new deferred tax asset is $200 \times 25\% = 50$.

Part B: The tax expense = the tax liability + the change in the deferred tax liability – the change in the deferred tax asset. Using the figures on the financial statements:

The tax liability for 20X2 = the tax expense + the change in the deferred tax asset – the change in the deferred tax liability = $500 + (40 - 40) - 0 = 500$.

The new law changes the December 31, 20X2 deferred tax asset to 50, so the tax expense changes to $500 + 0 - (50 - 40) = 490$.

Exercise 13.22: Financial securities, capital gains, and deferred taxes

On December 31, 20X0, a firm buys stock YY for 100, classified as held for trading, and stock ZZ for 100, classified as available for sale. The dividends received in 20X1 and 20X2 and the market values at year-end 20X1 and 20X2 are

	<i>Market Value at</i>	
	12.31.20X1	12.31.20X2
Stock YY	80	120
Stock ZZ	140	60
	<i>Dividends Received in</i>	
	20X1	20X2
Stock YY	4	5
Stock ZZ	6	3

- The firm sells both stock YY and stock ZZ on December 31, 20X2, at their market values.
 - The tax rate is 20% on dividends received and 10% on realized capital gains.
 - Unrealized capital gains are not taxed.
- A. What are unrealized capital gains and losses in 20X1?
 - B. What are realized capital gains and losses in 20X2?
 - C. What are unrealized capital gains and losses in 20X2?
 - D. What are the deferred tax assets and liabilities at 12.31.20X1?
 - E. What are the deferred tax assets and liabilities at 12.31.20X2?
 - F. What are the taxes paid in 20X1?
 - G. What are the taxes paid in 20X2?
 - H. What is the tax expense for 20X1?
 - I. What is the tax expense for 20X2?
 - J. What is net income in 20X1?
 - K. What is other comprehensive income in 20X1?
 - L. What is net income in 20X2?
 - M. What is other comprehensive income in 20X2?

Part A: The gain or loss is realized when the stock is sold and it is an unrealized capital gain or loss until then.

In 20X1, the unrealized capital gains and losses are –20 for stock YY and +40 for stock ZZ.

Part B: The realized capital gain or loss is the sale price minus the purchase price. Both stocks are sold in 20X2, so the realized capital gain or loss is +20 for stock YY and –40 for stock ZZ.

Part C: The accumulated unrealized capital gain or loss when the stock is sold is zero. At the beginning of the year 20X2, the accumulated unrealized capital gain or loss is –20 for stock YY and +40 for stock ZZ, so the unrealized capital gain or loss in 20X2 is +20 for stock YY and –40 for stock ZZ.

Part D: On 12.31.20X1, the firm owes no taxes on capital gains for either stock.

- If it sells stock YY on 12.31.20X1, it will have a tax liability of $10\% \times (80 - 100) = -2$. When it sells the stock (in a future year) this –2 tax liability will reduce its taxes, so it reports a deferred tax asset of 2 on its 20X1 balance sheet.

- If it sells stock ZZ on 12.31.20X1, it will have a tax liability of $10\% \times (140 - 100) = +4$. When it sells the stock (in a future year) this +4 tax liability will increase its taxes, so it reports a deferred tax liability of 4 on its 20X1 balance sheet.

Part E: On 12.31.20X2 both stocks are sold, so no taxes related to these stocks will be paid in future years. The deferred tax asset or liability is now zero.

Part F: The dividends are taxed when they are declared and paid. Countries differ regarding the date when the tax is incurred (declaration date, ex-dividend date, or payment date of the dividend); this practice problem assumes all these dates occur in 20X1 or 20X2.

The tax in 20X1 is $20\% \times 4 = 0.80$ for stock YY and $20\% \times 6 = 1.20$ for stock ZZ.

Part G: In 20X2, both the dividends and realized capital gains and losses are taxed.

- The tax on dividends in 20X2 is $20\% \times 5 = 1.00$ for stock YY and $20\% \times 3 = 0.60$ for stock ZZ.
- The tax on realized capital gains/losses is $10\% \times 20 = 2$ for stock YY and $10\% \times -40 = -4$ for stock ZZ.

Part H: The tax expense is the tax paid plus the change in the deferred tax liability minus the change in the deferred tax asset. For 20X1:

- tax paid = $0.80 + 1.20 = 2.00$
- increase in deferred tax liability = $4 - 0 = 4$ (stock ZZ)
- increase in deferred tax asset = $2 - 0 = 2$ (stock YY)

$$\text{tax expense} = 2 + 4 - 2 = 4$$

Part I: The deferred tax assets and liabilities are zero at December 31, 20X2, since the firm no longer owns the stocks.

- tax paid on dividends = $1.00 + 0.60 = 1.60$
- tax paid on realized capital gains and losses = $2 + -4 = -2$
- increase in deferred tax liability = $0 - 4 = -4$ (stock ZZ)
- increase in deferred tax asset = $0 - 2 = -2$ (stock YY)

$$\text{tax expense} = 1.6 + -2 + -4 - (-2) = -2.40$$

- For the two years, the total tax on dividends is $20\% \times (4 + 6 + 5 + 3) = 20\% \times 18 = 3.600$.
- The tax on realized capital gains and losses is $10\% \times -20 = -2$
- Unrealized capital gains and losses accumulate to zero over the two years and add nothing to tax.

The total tax over the two years = $3.6 - 2 = 1.60$: 4 in 20X1 and -2.4 in 20X2.

Part J: The shareholder dividends from both stocks minus the tax paid on them are included in net income.

For 20X1, these are $6 + 4 - (1.20 + 0.80) = 10 - 2 = 8$.

Unrealized capital gains and losses minus the related deferred taxes on stocks held for trading (stock YY) are included in net income, but not on stocks available for sale (stock ZZ).

For stock YY in 20X1, this is $-20 \times (1 - 10\%) = -18$.

Part K: Unrealized capital gains and losses on stocks available for sale (stock ZZ) are included in other comprehensive income. For stock ZZ in 20X1, this is +40.

Some accountants show other comprehensive income net of deferred taxes: unrealized capital gains and losses minus their deferred taxes on stocks available for sale (stock ZZ) are included in other comprehensive income. For stock ZZ in 20X1, this is $+40 \times (1 - 10\%) = 36$. For this accounting practice, the deferred taxes on the balance sheet do not include deferred taxes on other comprehensive income.

Part L: The shareholder dividends from both stocks minus the tax paid on them are included in net income.

For 20X2, these are $5 + 3 - (1.00 + 0.60) = 8 - 1.6 = 6.400$.

Realized capital gains and losses minus the related tax is included in net income for all stocks:

$(20 - 40) \times (1 - 10\%) = -18$.

Unrealized capital gains and losses minus the related deferred taxes on stocks held for trading (stock YY) are included in net income, but not on stocks available for sale (stock ZZ). The accumulated unrealized capital gains or losses over the life of the stock is zero, so the unrealized capital gain for stock YY in 20X2 is 20, and the addition to net income is $20 \times (1 - 10\%) = 18$.

Total net income is $6.4 - 18 + 18 = 6.400$.

Part M: The accumulated unrealized capital gains or losses over the life of the stock is zero, so the unrealized capital loss for stock ZZ in 20X2 is -40 , and the other comprehensive income is -40 . If other comprehensive income is shown net of deferred taxes, it is $-40 \times (1 - 10\%) = -36$.