

FA Module 16: Equity method of accounting – practice problems

(The attached PDF file has better formatting.)

Subsidiary vs associate

Many people refer to a firm owned, controlled, or significantly influenced by another firm as a subsidiary. IFRS refers to a firm significantly influenced (but not controlled) by another firm as an associate. Both terms are used in the practice problems.

Goodwill impairment

The textbook explains the IFRS and GAAP methods of testing goodwill for impairment.

The FASB has eliminated the calculation of the implied fair value of goodwill (the second part of the textbook's goodwill impairment test) to measure the goodwill impairment. Rather, firms base the impairment on the excess of the reporting unit's carrying amount over its fair value, similar to the IFRS goodwill impairment. The new GAAP rules take effect in 2020 for firms that file with the SEC, and early adoption is permitted after 1 January 2017.

Ownership percentages for the equity method

Question: If the parent owns exactly 20% or exactly 50% of the subsidiary, does it use the equity method?

Answer: In theory, the parent decides whether it has significant influence on the subsidiary. The textbook gives problems showing how the firm decides whether to use the equity method or a passive investment method (available for sale or held for trading). The FASB and the IASB give default figures:

- ! If the firm owns *less than 20%* of the voting stock, it uses a passive investment method.
- ! If the firm owns *20% or more and 50% or less* of the voting stock, it uses the equity method
- ! If the firm owns *more than 50%*, it uses the consolidation method

Two observations help you recall these rules.

- ! One firm might have control of another; two firms cannot both have control of a third firm. If two firms each own 50% of a third, each has significant influence but not control.
- ! Firms sometimes buy 19.9% of the outstanding shares of another firm. As long as the percentage is below 20%, they may use a passive investment method. They don't buy exactly 20% of the other firm, since they would be deemed to have significant influence.

Changes in ownership percentage

Question: Many firms buy first a small percentage of another firm and increase their shares over several years. If a firm owns 15% of another firm in 20X1 but 25% in 20X2, does it use a passive investment method, such as available for sale, in 20X1 and the equity method in 20X2?

Answer: If a firm increases its ownership percentage from below 20% to above 20%, it restates its financial statements retroactively after starting to use the equity method, so that its financial statements are consistent from year to year.

Question: Does the same apply if a firm reduces its ownership percentage from above 20% to below 20%?

Answer: If a firm reduces its ownership percentage from above 20% to below 20%, it stops using the equity method and uses instead a passive investment method, but it does not restate past financial statements.

These re-statement rules are not in the textbook and are not tested on the final exam.

Inter-company transactions

Question: Are inter-company transactions treated the same way for the equity method and for consolidations?

Answer: Consolidation adds the assets and liabilities of the parent and subsidiary. Inter-company transactions eliminate the effects on the individual accounts. The equity method has a single line item for the equity from investments in subsidiaries (associates). The assets and liabilities are not affected, but the gain from inter-company transactions is removed from the line item for the equity from investments in subsidiaries.

The final exam problems assume all financial statement entries *except net income and retained earnings* are not affected by inter-company transactions. The only entry that changes is the income from investment in subsidiaries; this entry affects net income of the parent, which affects retained earnings of the parent.

An alternative accounting method for upstream sales changes the inventory entry for the parent. You are not responsible for this alternative method, which is not discussed in the textbook.

Exercise 16.1: Cash flows for financial assets

Firms WW, YY, and ZZ each have 100 shares outstanding. On January 1, 20X2, ABC buys

- ! 10 shares of WW, classified as held for trading
- ! 10 shares of YY, classified as available for sale
- ! 40 shares of ZZ, using the equity method

Selected financial information for WW, YY, and ZZ is shown below.

	WW	YY	ZZ
Net income for 20X2	43	42	41
Dividends paid to shareholders in 20X2	13	12	11
Interest expense for 20X2	3	2	1
Market value of a share at beginning of 20X1	6	5	4
Market value of a share at year-end 20X2	9	8	7

- A. What is ABC's 20X2 net income from these investments?
- B. What is ABC's 20X2 operating cash flow from these investments?
- C. What is ABC's 20X2 investing cash flow from these investments?

Part A: Compute for each investment:

WW is classified as held for trading, so both dividends and the change in market value are included in net income. Dividends are $10/100 \times 13 = 1.3$; the change in market value is $10 \times (9 - 6) = 30$. The contribution to ABC's net income is $1.3 + 30 = 31.3$. WW's own net income does not affect ABC's net income.

YY is classified as available for sale so only dividends are included in net income. Dividends are $10/100 \times 12 = 1.2$, which is the contribution to ABC's net income.

ABC reports the investment in ZZ using the equity method, so the contribution to ABC's net income is $40/100 \times 41 = 16.4$.

Question: ABC received dividends of $40/100 \times 11 = 4.4$ from ZZ. Dividends are cash; why aren't they included in ABC's net income?

Answer: You can view this from a financial perspective or an accounting perspective:

Financial perspective: The dividends are paid from ZZ's net income. ABC's portion of ZZ's entire net income is included in its own net income; if it also included the dividends, it would count them twice. ZZ's net income minus the dividends it pays to shareholders is its change in retained earnings. ABC's share of ZZ's change in retained earnings + its share of ZZ's dividends is the same as ABC's share of ZZ's net income.

Accounting perspective: On its balance sheet, ABC increases cash by the dividends it receives from ZZ and increases its asset called "investment in subsidiaries" by its share of ZZ's net income minus the dividends received. The total change in these assets (a debit) equals the total net income (a credit). This total amount is ABC's share of ZZ's net income.

Part B: For GAAP, dividends received are operating cash flows. They are

$$10/100 \times 13 + 10/100 \times 12 + 40/100 \times 11 = 1.3 + 1.2 + 4.4 = 6.9.$$

Part C: The purchase of the investments is an investing cash flow:

$$10 \times 6 + 10 \times 5 + 40 \times 4 = 60 + 50 + 160 = 270$$

Under IFRS, the dividends received may be classified as either operating cash flows or investing cash flows.

Question: Do the changes in market value affect investing cash flows?

Answer: Changes in market value are non-cash items and do not affect cash flows.

Exercise 16.2: Equity method

Firms ABC and XYZ show the following income statement entries for 20X1 and 20X2 and balance sheet entries for December 31, 20X1 and 20X2 on their separate financial statements (not including any ownership of one firm by the other). The corporate tax rate is zero.

<i>Calendar year 20XX</i>	<i>ABC</i>		<i>XYZ</i>	
	<i>20X1</i>	<i>20X2</i>	<i>20X1</i>	<i>20X2</i>
Net revenue	800	800	400	400
Operating income	500	500	250	250
Interest expense	48	48	24	24
Shareholder dividends paid	152	152	76	76
<i>December 31, 20XX</i>	<i>20X1</i>	<i>20X2</i>	<i>20X1</i>	<i>20X2</i>
Total assets	2000	2300	1000	1150
Total debt	600	600	300	300
Shareholders' equity	1000	1300	600	750
Shares outstanding	100	100	100	100
Market price per share	25	30	10	12

On December 31, 20X1, ABC pays 500 in cash to buy 50 shares of XYZ's outstanding stock. The fair value of XYZ's identifiable net assets is 700, and the book value of the identifiable net assets is 550. The only asset or liability whose fair value differs from its book value is land.

The accounting for this investment depends on whether ABC has control of XYZ or just significant influence over XYZ.

If ABC has significant influence over XYZ but not control of XYZ, then

- What are ABC's assets, debt, and equity at December 31, 20X1, including its investment in XYZ?
- What is ABC's net income in 20X2, including its investment in XYZ?
- What are ABC's assets, debt, and equity at December 31, 20X2, including its investment in XYZ?
- What is ABC's net profit margin in 20X2?
- What is ABC's debt-to-equity ratio in 20X2?

Background: The two major differences between the equity method and the consolidation method are

- ! The equity method has (i) a single entry for investment in associates and (ii) a single entry for net income from associates. The consolidation method combines all assets, liabilities, revenues, and expenses.
- ! The equity method includes only the acquirer's share of the fair value of the associate. The consolidation method uses the total fair value of each asset, liability, revenue, or expense of the associate, and it shows a non-controlling (minority) interest on both the income statement and the balance sheet.

Financial ratios differ for the equity method vs the consolidation method. The net income after subtraction of the non-controlling (minority) interest is the same for the two methods, but assets, revenue, liabilities (debt), and shareholders' equity are greater for the consolidation method. If all these values are positive, the return on assets, return on equity, and net profit margin are greater for the equity method; the debt-to-equity ratio may be greater or lower the equity method.

Goodwill is treated differently by the two methods. Goodwill is part of the investment in associates for the equity method; it is not reported separately. Similarly, the investment in associates is tested for impairment; the goodwill is not tested separately. Goodwill is reported and tested separately in the consolidation method.

Part A: At the purchase date, the "investment in XYZ" is the price paid. The balance sheet accounting entries are (i) credit cash 500 and (ii) debit the "investment in XYZ" 500. Total assets remain 2,000, total debt remains 600, and shareholders' equity remains 1,000.

Question: Shouldn't shareholders' equity be total assets minus total debt?

Answer: The remaining 400 are non-debt liabilities, such as current liabilities, deferred tax liabilities, and net pension liabilities. This exercise does not show all ABC's liabilities.

Part B: ABC's net income in 20X2 = the income from its own operations + its share of XYZ's income.

! During 20X2, ABC has net income from its own operations of operating income minus interest expense = $500 - 48 = 452$.

! It pays 152 in shareholder dividends, so

" the increase in its retained earnings is $500 - 48 - 152 = 300$

" its shareholders' equity at December 31, 20X2, is $1,000 + 500 - 48 - 152 = 1,300$

Question: ABC's market value is $100 \times 25 = 2,500$. Why is shareholders' equity only 1,300?

Answer: Shareholders' equity is the book value. Half of XYZ was acquired by ABC, and the acquisition is reported at its fair value (= market value), not its book value. ABC was not acquired, so it is reported at its book value. Distinguish four values:

! Book value of identifiable net assets: includes book values (mostly historical cost or depreciated cost) of tangible assets, land, and intangible identifiable assets acquired from others. Most intangible assets that are developed in-house have zero book values; the textbook notes the exceptions, such as software development costs and parts of research and development costs for IFRS.

! Fair value of identifiable net assets: includes identifiable assets at market value; does not include goodwill.

! Book value of the entity: equals the book value of identifiable net assets plus the book value of goodwill.

! Fair value of the entity: equals the market value of the firm.

ABC also has net income from the investment in XYZ = 50% of XYZ's net income = $50\% \times (250 - 24) = 113$. Its cash assets increase by the $50\% \times 76 = 38$ of dividends received, and its investment in XYZ increases by 113 net income minus 38 dividends received = 75 . The three accounting entries articulate (debits = credits):

! debit 38 dividends received (balance sheet)

! debit 75 investment in associates (balance sheet)

! credit 113 net income (income statement)

Part C: ABC's assets, debt, and shareholders' equity at December 31, 20X2, are the entries at December 31, 20X1, plus the changes from its own net income and its share of XYZ's net income in 20X2.

! Assets: $2,000 + 300 + 113 = 2,413$.

! Debt does not change.

! Shareholders' equity: $1,000 + 300 + 113 = 1,413$.

Question: The practice problem has ABC's income statement entries twice those of XYZ. Why is the addition of 300 from ABC's own operations not four times the addition of 113 from ABC's share of XYZ's operations?

Answer: The relation of four times is correct: ABC is twice the size of XYZ, and ABC owns 50% of XYZ.

$4 \times 113 = 452$, which is ABC's net income for 20X2.

ABC pays shareholder dividends of 152, and it retains $452 - 152 = 300$ of the net income. XYZ also pays shareholder dividends, but ABC is the recipient of its share of XYZ's shareholder dividends.

Part D: ABC's net profit margin in 20X2 is net income / net revenue =

$$(300 + 152 + 113) / 800 = 70.63\%$$

Question: The net income is from ABC's own operations and from ABC's share of XYZ's operations. The net revenue is from ABC's own operations only. Does this difference distort the net profit margin?

Answer: The financial ratios net profit margin, return on equity, return on assets, and debt-to-equity ratio are used by financial analysts; they are not IFRS or GAAP items. Many accounting circumstance distort financial ratios; consolidation gives different results for the full goodwill method vs the partial goodwill method.

The net profit margin may be distorted for the equity method, but the return on equity is not distorted. In 20X2, ABC has 500 of assets supporting its investment in XYZ and 1,500 of assets supporting its own operations. Its net income is 113 from its share of XYZ's operations and 452 (before dividends) from its own operations.

Part E: The debt-to-equity ratio is $600 / 1,413 = 0.4246$

Question: Is the debt-to-equity ratio distorted by the equity method? The purchase of 50% of XYZ changes shareholders' equity but not total debt.

Answer: The equity method shows a lower debt-to-equity ratio than the consolidation method shows. The consolidation method is perhaps a better portrayal of ABC's financial position, since it has implicitly assumed 50% of XYZ's debt. But ABC is not legally obligated to pay the debt if XYZ becomes insolvent.

Exercise 16.3: Equity method

XYZ has 100 shares outstanding on 12/30/20X1. It does not issue new shares or repurchase any of its outstanding shares in 20X2 or 20X3.

- ! On 12/31/20X1 ABC buys 5 shares for 10 per share.
- ! On 12/31/20X2 ABC buys another 20 shares for 12 per share.

XYZ shows the following for 20X2 and 20X3. Assume that firms are not taxed on investment income.

	20X2	20X3
<i>Net Income</i>	100	100
<i>Other Comprehensive Income</i>	60	60
<i>Dividends Paid to Shareholders</i>	40	40

- A. What is ABC's 20X2 income from its investment in XYZ?
- B. How is this income allocated between net income and other comprehensive income?
- C. What is the value of ABC's "investment in XYZ" on its December 31, 20X2, balance sheet?
- D. What is ABC's 20X3 net income and other comprehensive income from its investment in XYZ?
- E. What is the value of ABC's "investment in XYZ" on its December 31, 20X3, balance sheet?

Part A: In 20X2, ABC has $5 / 100 = 5\%$ of XYZ's shares, so it has a passive investment. Its investment income is dividends received + the change in the market value of its shares.

- ! Dividends received = $5\% \times 40 = 2$.
- ! The change in the market value of its shares is $5 \times (12 - 10) = 10$.

Part B: The dividends received flow through the income statement. The change in the market value is net income if the shares are held for trading and other comprehensive income if the shares are available for sale.

For passive investments, the financial statement income of the purchased firm does not affect the income reported by the investing firm.

Part C: On December 31, 20X2, ABC buys another 20 shares. With 25 shares, it owns 25% of XYZ, so it uses the equity method of accounting. It shows a balance sheet asset called "investment in XYZ," or "investment in associates," or "investment in subsidiaries" of $25 \times 12 = 300$.

Part D: XYZ has net income of 100 and other comprehensive income of 60. ABC owns 25% of XYZ, so it included $25\% \times 100 = 25$ in its own net income and $25\% \times 60 = 15$ in its own other comprehensive income.

Part E: The balance sheet asset "investment in associates" is increased each period by the net income and other comprehensive income coming from the associates, and it is decreased each period by the shareholder dividends from the associates. In 20X3, its dividends received from XYZ is $25\% \times 40 = 10$. Its balance sheet asset "investment in associates" is $300 + 25 + 15 - 10 = 330$.

Question: The net income on ABC's income statement does not subtract the dividends received, but the change in the balance sheet asset subtracts the dividends received. Is that consistent?

Answer: Shareholder dividends are paid from net income.

- ! ABC's share of XYZ's income is $25 + 15 = 40$.
- ! ABC's share of the dividends that XYZ paid to its shareholders 10 (reducing income).
- ! ABC's receives 25% of the dividends that XYZ paid to its shareholders = 10 (increasing income).

The income that XYZ earns is received from third parties, so ABC gets its 25% share. The dividends that ABC gets from XYZ just moving cash from ABC's share of XYZ to ABC's own bank account.

On the balance sheet, ABC's share of XYZ' income increases the asset "investment in associates." The dividends received increase the asset called "cash" by moving money from "investment in associates."

Exercise 16.4: Equity method

On December 31, 20X1, XYZ has 500 shares outstanding at a market value 10 per share. ABC buys 200 share of XYZ at the market price. The book values and fair values of XYZ's assets and liabilities are

	<i>Book Value</i>	<i>Fair Value</i>
<i>Current Assets</i>	300	300
<i>Equipment</i>	1,300	1,800
<i>Patent</i>	0	1,200
<i>Land</i>	1,000	2,200
<i>Liabilities</i>	(800)	(800)
<i>Total</i>	1,800	4,700

The equipment has a ten year estimated remaining useful life, which is also the estimated remaining useful life on XYZ's balance sheet. The patent has an estimated remaining useful life of 12 years. Both ABC and the associate use straight line depreciation.

In 20X2, XYZ has net income of 500 and pays dividends to shareholders of 100.

XYZ's share price on December 31, 20X2, is 12 per share.

- A. What is the excess purchase price? How is it allocated to identifiable assets and to goodwill?
- B. What is the goodwill reported on ABC's balance sheet at December 31, 20X1?
- C. What is ABC's "investment in associates" at December 31, 20X1?
- D. What is ABC's income from XYZ in 20X2?
- E. What is ABC's "investment in associates" at December 31, 20X2?
- F. If ABC elected to use the fair value option at initial recognition, what is the net income from associates on ABC's income statement in 20X2?

Part A: ABC owns 200 of 500 outstanding shares, or 40%, so it uses the equity method, not the consolidation method. The purchase price is $200 \times 10 = 2,000$.

The book value of XYZ's identifiable net assets is $300 + 1,300 + 0 + 1,000 - 800 = 1,800$. ABC's share is $40\% \times 1,800 = 720$. The excess purchase price is $2,000 - 720 = 1,280$. We allocate the excess purchase price among identifiable assets and goodwill so that we can amortize each part.

- ! XYZ has equipment with a book value of 1,300 and a fair value of 1,800. The excess of fair value over book value is $1,800 - 1,300 = 500$, and ABC's share is $40\% \times 500 = 200$. XYZ depreciates the book value of the equipment over the remaining estimated useful life of 10 years at 130 a year. ABC values the equipment at its fair value of 1,800, which is depreciated over the coming ten years at 180 a year. ABC's share (40%) of the *extra* depreciation is shown on its income statement: -20
- ! The patent has zero book value (it was developed in-house) but 1,200 fair value, and the excess purchase price allocated to the patent is $40\% \times 1,200 = 480$. Its estimated useful life is 12 years, or $1,200 / 12 = 100$ amortization a year. ABC's share (40%) of the amortization is shown on its income statement: -40.
- ! The excess of the land's fair value over its book value is $2,200 - 1,000 = 1,200$, and the excess purchase price allocated to the land is $40\% \times 1,200 = 480$. Land is not depreciated, so the excess of the fair value over the book value of the land does not affect ABC's income statement.

The total excess purchase price is 1,280. The excess purchase price allocated to the identifiable assets is $200 + 480 + 480 = 1,160$, so the goodwill is $1,280 - 1,160 = 120$.

We verify the goodwill: The fair value of XYZ's identifiable net assets is $300 + 1,800 + 1,200 + 2,200 - 800 = 4,700$. ABC's share is $40\% \times 4,700 = 1,880$. ABC paid $40\% \times 5,000 = 2,000$, so its goodwill is $5,000 - 1,880 = 120$. This goodwill is not reported separately and is not amortized.

XYZ continues to depreciate and amortizes the book value of its assets: 130 a year for equipment and nothing for the patent. The depreciation and amortization of the excess purchase price allocated to the identifiable assets appears on ABC's income statement, not XYZ's income statement.

Part B: The goodwill is included in the balance sheet entry "investment in associates." It is not reported separately and it is not amortized.

Question: Is the goodwill relevant to this practice problem if it is not reported on the balance sheet?

Answer: The fair value of the acquired net identifiable assets exceeds their book value, and the excess is amortized over their estimated useful lives, affecting net income in subsequent years. If the identifiable asset has an indefinite life, as land does, the excess of fair value over book value is not amortized. The excess of the purchase price over the fair value of the acquired net identifiable assets is goodwill and is not amortized.

Question: Is the goodwill tested for impairment?

Answer: The goodwill is not tested separately for impairment, but the total investment in associates is tested for impairment.

Part C: ABC buys 200 shares for 10 a share, so it pays 2,000, which is the fair value of the consideration received for the investment in XYZ and is the reported value on ABC's balance sheet.

Part D: XYZ reports net income of 500. ABC owns 40% of XYZ, so it reports 200 of net income \pm depreciation or amortization of the excess of fair value over book value of identifiable assets.

- ! XYZ has equipment with a book value of 1,300, which is depreciated over the coming ten years at 130 a year. ABC values this equipment at its fair value of 1,800, which is depreciated over the coming ten years at 180 a year. The extra depreciation is $180 - 130 = 50$. ABC's share (40%) of the *extra* depreciation is shown on its income statement: -20
- ! The patent has zero book value (it was developed in-house) but 1,200 market value. It is amortized over 12 years at 100 a year. ABC's share (40%) of the amortization is shown on its income statement: -40 .
- ! The land is not depreciated, so the excess of the fair value over the book value of the land does not affect ABC's income statement.

ABC reports net income from its investment in XYZ at $200 - 20 - 40 = 140$.

Part E: The change to the balance sheet asset "investment in associates" is the reported net income from XYZ (+140) minus the dividends received from XYZ (-40) = +100.

The investment in associates at December 31, 20X2, is $2,000 + 140 - 40 = 2,100$.

Part F: Firms may choose a fair value option for reporting equity method investments. (IFRS and GAAP differ of which firms may choose the fair value option.) The equity method investment is treated as held for trading security: the balance sheet value is the market value of the shares and the change in this market value from the previous year is reported on the income statement (the statement of profit and loss).

For this practice problem, the change in market value is $(12 - 10) \times 200 = 400$.

Exercise 16.5: Equity method (no goodwill or inter-company transactions)

- ! XYZ's share price is 20, 22, 24, and 30 on December 31, 20X1, 20X2, 20X3, and 20X4.
- ! XYZ's book value is 2,000 on December 31, 20X1.
- ! In 20X2, 20X3, and 20X4, XYZ
 - " reports net income of 400, 600, 800.
 - " pays shareholder dividends of 100, 200, and 400.

ABC buys 40 of XYZ's 100 outstanding shares on December 31, 20X1. ABC has no operations besides its investment in XYZ. The corporate tax rate on income from subsidiaries is zero.

- A. What are ABC's accounting entries on December 31, 20X1?
- B. What is ABC's net income in 20X2, 20X3, and 20X4?
- C. What is ABC's investment in subsidiaries on December 31, 20X2, 20X3, and 20X4?

Part A: The accounting for ownership of shares in another firm differs for passive, influential, and controlling investments. ABC buys 40% of XYZ's shares, so it has significant influence but not control, and it uses the equity method of accounting. ABC pays $40 \times 20 = 800$ on December 31, 20X1. The accounting entries are

- ! Credit cash (an asset) 800
- ! Debit investment in subsidiaries (an asset) 800

Net income is zero on the purchase date, except for bargain purchases under the consolidation method.

Part B: ABC's 40% share of XYZ's net income gives it net income of

- ! 20X2: $40\% \times 400 = 160$
- ! 20X3: $40\% \times 600 = 240$
- ! 20X4: $40\% \times 800 = 320$

The net income is a separate line item called income from investment in subsidiaries (GAAP) or income from associates (IFRS).

XYZ reports net revenue, cost of goods sold, depreciation, interest expense, tax expense, and so forth. ABC reports its share of XYZ's net income as a single line item. The two firms do not consolidate their accounts.

Part C: The change in ABC's investment in subsidiaries is ABC's share of XYZ's net income minus XYZ's dividends paid to ABC.

- ! December 31, 20X2: $800 + 40\% \times (400 - 100) = 920$
- ! December 31, 20X3: $920 + 40\% \times (600 - 200) = 1,080$
- ! December 31, 20X4: $1,080 + 40\% \times (800 - 400) = 1,240$

Question: In 20X2, ABC reports net income of 160 from its investment in XYZ but its investment in XYZ increases only 120. Where does the other 40 go?

Answer: The 160 of net income increases ABC's assets 160. The shareholder dividends from XYZ increase cash 40; the remainder ($160 - 40 = 120$) increases the investment in XYZ. The receipt of the dividends

- ! credits (decreases) investment in subsidiaries 40
- ! debits (increases) cash 40.

Question: Aren't share prices and shareholder dividends better indicators of value than book income?

Answer: The equity method reflects the accrual model: Income is recognized as it is earned, not when cash (dividends) is received. The equity method shows double-entry book-keeping:

- ! shareholder dividends from subsidiary:
 - " debit cash
 - " credit investment in subsidiary
- ! subsidiary's net income:
 - " credit parent's net income
 - " debit the investment in subsidiary

Exercise 16.6: Equity method with downstream sale

On December 31, 20X0, ABC has 250 units of inventory with a cost of 3 per unit, and XYZ has no inventory. ABC buys 40% of XYZ's outstanding stock.

In 20X1, ABC sells 100 units of inventory to XYZ at a price of 5 per unit, none of which is resold to outside parties in 20X1. Neither ABC nor XYZ have any other activities in 20X1.

- A. What are ABC's and XYZ's net revenue in 20X1?
- B. What are ABC's and XYZ's cost of goods sold in 20X1?
- C. What are ABC's and XYZ's inventory at December 31, 20X1?
- D. What are ABC's and XYZ's net income in 20X1?

Part A: Net revenue, cost of goods sold, and inventory are not affected by the inter-company transaction.

In 20X1, ABC's net revenue is $100 \times 5 = 500$, and XYZ's net revenue is zero.

Part B: In 20X1, ABC's cost of goods sold is $100 \times 3 = 300$, and XYZ's cost of goods sold is zero.

Part C: At December 31, 20X1, ABC's remaining inventory is $250 - 100 = 150$ units \times 3 per unit = 450. Inventory decreases by $100 \times 3 = 300$ from December 31, 20X0, to December 31, 20X1.

At December 31, 20X1, XYZ's inventory is $100 \times 5 = 500$. XYZ's increase in inventory does not equal ABC's decrease in inventory because they have different costs: 5 for XYZ and 3 for ABC.

Part D: XYZ's net revenue, cost of goods sold, and other expenses are zero, so its net income is zero.

ABC's net revenue = 500 and its cost of goods sold = 300, so its net income before the adjustment for inter-company transactions is $500 - 300 = 200$. We think of the sale to XYZ in two parts:

- ! The 40% sold to the part of XYZ that ABC owns is an inter-company transfer: *not* reported as net income.
- ! The 60% sold to the part of XYZ that ABC does not own is a sale to outsiders: reported as net income.

Of the 200 net income from the sale to XYZ, $40\% \times 200 = 80$ is deferred (unrealized). The deferral is reported as a deduction from the line item "income from investment in subsidiaries, which becomes $0 - 80 = -80$. ABC's total net income is $200 - 80 = 120$.

Exercise 16.7: Downstream sale with a portion re-sold to outsiders

On December 31, 20X0, ABC has 250 units of inventory with a cost of 3 per unit, and XYZ has no inventory. ABC buys 40% of XYZ's outstanding stock.

In 20X1, ABC sells 100 units of inventory to XYZ at a price of 5 per unit. XYZ sells 70 units to outside parties in 20X1 at a price of 6 per unit, and it sells 30 units to outside parties in 20X2 at a price of 6 per unit. Neither ABC nor XYZ has other activities in 20X1 or 20X2.

- A. What are ABC's and XYZ's net revenue in 20X1 and 20X2?
- B. What are ABC's and XYZ's cost of goods sold in 20X1 and 20X2?
- C. What are ABC's and XYZ's inventory at December 31, 20X1 and 20X2?
- D. What are ABC's and XYZ's net income in 20X1 and 20X2?

Part A: Net revenue is not consolidated in the equity method.

- ! In 20X1, ABC's net revenue is $100 \times 5 = 500$, and XYZ's net revenue is $70 \times 6 = 420$.
- ! In 20X2, ABC's net revenue is zero, and XYZ's net revenue is $30 \times 6 = 180$.

Part B: Cost of goods sold is not consolidated in the equity method.

- ! In 20X1, ABC's cost of goods sold is $100 \times 3 = 300$, and XYZ's cost of goods sold is $70 \times 5 = 350$.
- ! In 20X2, ABC's cost of goods sold is zero, and XYZ's cost of goods sold is $30 \times 5 = 150$.

Part C: Inventory is the actual inventory held.

- ! ABC's remaining inventory is $(250 - 100) \times 3 = 450$ at December 31, 20X1 and 20X2.
- ! At December 31, 20X1, XYZ's remaining inventory is $30 \times 5 = 150$.
- ! At December 31, 20X2, XYZ's remaining inventory is zero.

Part D: We adjust net income for the inter-company transaction.

ABC's net revenue = 500 and its cost of goods sold = 300, so its net income before the adjustment for inter-company transactions is $500 - 300 = 200$. We think of the sale to XYZ as:

- ! The 60% sold to the part of XYZ that ABC does not own is a sale to outsiders, so it is net income.
- ! The 40% sold to the part of XYZ that ABC owns has two pieces:
 - " 70% of this 40% is re-sold by XYZ is sent to outsiders, so it is reported as net income.
 - " 30% of this 40% is still held by XYZ is an inter-company transfer, so it is *not* net income.

The inter-company transfer percentage is the percentage of XYZ owned by ABC \times the percentage of the inter-company transaction that has not yet been resold to outsiders: $40\% \times 30\% = 12\%$. The remainder is the 60% that ABC sold to the portion of XYZ that it does not own + the percentage that XYZ resold of the sales to the portion of XYZ that it does own = $60\% + 70\% \times 40\% = 88\%$.

The inter-company transactions are deducted from the income from investments in subsidiaries. We compute this income assuming no inter-company transactions:

- ! XYZ's net revenue = $70 \times 6 = 420$ and its cost of goods sold = $70 \times 5 = 350 \Rightarrow$
 - " XYZ's net income is $420 - 350 = 70$.
- ! ABC's portion of XYZ's net income is 40% \Rightarrow
 - " ABC's "income from investment in subsidiaries" = $40\% \times 70 = 28$.

On ABC's income statement, 12% of the 200 unadjusted net income = 24 is an inter-company transfer, so it is deducted from the entry labeled "income from investment in subsidiaries." The adjusted entry for "income from investment in subsidiaries" is $28 - 24 = 4$. ABC's total net income = $200 + 4 = 204$.

No adjustment is made on XYZ's income statement, which is not consolidated.

Question: This presentation seems strange. If XYZ had not resold any of the inventory in 20X1, ABC would show a negative "income from investment in subsidiaries."

Answer: Consolidation (when the parent controls the subsidiary) changes the net revenue and cost of goods sold entries to eliminate inter-company transactions, which gives a clearer view. The equity method shows a single line item for the income from subsidiaries, so the single adjustment is the best we can do. The notes to the financial statements explain the inter-company transactions.

In 20X2, XYZ sells the remaining 30% at a price of 6, so its net income is $30\% \times 100 \times (6 - 5) = 30$.

In 20X2, ABC's net income is 40% of XYZ's 20X2 net income + the reversal of the deferral from the 20X1 net income: $40\% \times 30 + 24 = 36$.

Question: The 30% that XYZ sold in 20X2 seems to be counted twice on ABC's income statement: once as XYZ's 20X2 net income and a second time as the reversal of the deferral from the 20X1 net income.

Answer: Each unit sold contributes two parts to ABC's net income:

- ! 100% of ABC's profit of $(5 - 3)$.
- ! 40% of XYZ's profit of $(6 - 5)$.

Question: How might we verify that all the net income is reported and none is counted twice?

Answer: The net income for the two year combined is $204 + 36 = 240$. By the end of the second year, all the inventory has been resold to outsiders, so we ignore the inter-company transactions.

- ! ABC sold goods to XYZ at a profit of $100 \times (5 - 3) = 200$.
- ! XYZ sold goods to outsiders at a profit of $100 \times (6 - 5) = 100$.

ABC's total net income is $200 + 40\% \times 100 = 240$.

Exercise 16.8: Equity method with upstream sale

On December 31, 20X0, XYZ has 250 units of inventory with a cost of 3 per unit, and ABC has no inventory. ABC buys 40% of XYZ's outstanding stock.

In 20X1, XYZ sells 100 units of inventory to ABC at a price of 5 per unit, none of which is resold to outside parties in 20X1. Neither ABC nor XYZ has other activities in 20X1.

- A. What are ABC's and XYZ's net revenue in 20X1?
- B. What are ABC's and XYZ's cost of goods sold in 20X1?
- C. What are ABC's and XYZ's inventory at December 31, 20X1?
- D. What are ABC's and XYZ's net income in 20X1?

Part A: Net revenue, cost of goods sold, and inventory are not affected by the inter-company transaction. GAAP allows an alternative accounting format of adjusting the parent's inventory for the upstream sale. For final exam problems, use the formulas here; the alternative accounting format is less frequently used.

In 20X1, XYZ's net revenue is $100 \times 5 = 500$, and ABC's net revenue is zero.

Question: ABC owns 40% of XYZ; why isn't its net revenue $40\% \times 500 = 200$?

Answer: If ABC owned 60% of XYZ, it would control XYZ and use the consolidation method. It would show consolidated net revenue of 500. All of XYZ's net revenue is consolidated, not just 60%. Similarly, it would show consolidated cost of goods sold of 300. In this exercise, ABC owns 40% of XYZ, so it has significant influence but not control, so it does not show consolidated financial statements.

Question: In the 60% ownership scenario, if revenue and expenses are consolidated, ABC's net income would be 200, even though it owns only 60% of XYZ. This net income is over-stated, since ABC receives only 60%.

Answer: ABC would also show a non-controlling (minority) interest for $40\% \times 200 = 80$ of net income.

Question: Why show the full consolidated accounting entries and the non-controlling (minority) interest. Why not show just the portion that ABC owns?

Answer: If ABC controls XYZ, it controls XYZ's sales, purchases, operations, and other activities. ABC's financial statements cover everything that it controls. The non-controlling (minority) interests are passive investors. They receive a portion of the net income, but they make no decisions about XYZ's operations.

Part B: In 20X1, XYZ's cost of goods sold is $100 \times 3 = 300$, and ABC's cost of goods sold is zero.

Part C: At December 31, 20X1, XYZ's remaining inventory is $(250 - 100) = 150 \times 3 = 450$. Inventory decreases by $100 \times 3 = 300$ from December 31, 20X0, to December 31, 20X1.

At December 31, 20X1, ABC's inventory is $100 \times 5 = 500$. ABC's increase in inventory does not equal XYZ's decrease in inventory because they have different costs: 3 for XYZ and 5 for ABC.

Part D: XYZ's net income is $500 - 300 = 200$.

ABC's income from its investment in subsidiaries before the adjustment for inter-company transactions is $40\% \times 200 = 120$. The entire 120 is not yet resold to outsiders, so it is deferred. ABC's income from its investment in subsidiaries after the adjustment for inter-company transactions is $120 - 120 = 0$.

Exercise 16.9: Upstream sale with a portion re-sold to outsiders

On December 31, 20X0, XYZ has 250 units of inventory with a cost of 3 per unit, and ABC has no inventory. ABC buys 40% of XYZ's outstanding stock.

In 20X1, XYZ sells 100 units of inventory to ABC at a price of 5 per unit. ABC sells 70 units to outside parties in 20X1 at a price of 6 per unit, and it sells 30 units to outside parties in 20X2 at a price of 6 per unit. Neither ABC nor XYZ has other activities in 20X1 or 20X2.

- A. What are ABC's and XYZ's net revenue in 20X1 and 20X2?
- B. What are ABC's and XYZ's cost of goods sold in 20X1 and 20X2?
- C. What are ABC's and XYZ's inventory at December 31, 20X1 and 20X2?
- D. What are ABC's and XYZ's net income in 20X1 and 20X2?

Part A: Net revenue is not consolidated in the equity method.

- ! In 20X1, XYZ's net revenue is $100 \times 5 = 500$, and ABC's net revenue is $70 \times 6 = 420$.
- ! In 20X2, XYZ's net revenue is zero, and ABC's net revenue is $30 \times 6 = 180$.

Part B: Cost of goods sold is treated the same as net revenue.

- ! In 20X1, XYZ's cost of goods sold is $100 \times 3 = 300$, and ABC's cost of goods sold is $70 \times 5 = 350$.
- ! In 20X2, XYZ's cost of goods sold is zero, and ABC's cost of goods sold is $30 \times 5 = 150$.

Part C: Inventory is the actual inventory held.

- ! XYZ's remaining inventory is $(250 - 100) = 150 \times 3 = 450$ at December 31, 20X1 and 20X2.
- ! At December 31, 20X1, ABC's remaining inventory is $30 \times 5 = 150$.
- ! At December 31, 20X2, ABC's remaining inventory is zero.

Part D: We adjust net income for the inter-company transaction.

XYZ's net revenue = 500 and its cost of goods sold = 300, so its net income before the adjustment for inter-company transactions is $500 - 300 = 200$. ABC owns 40% of XYZ, so ABC's net income (if not for the inter-company transaction) would be $40\% \times 200 = 80$.

ABC resells 70 units in 20X1 at a price of 6 per unit. Its income from its own operations = units sold \times (sales price - cost) = $70 \times (6 - 5) = 70$.

ABC has not yet resold (or consumed) 30 of the 100 units that it bought from XYZ, so 30% of its share of XYZ's net income is unrealized and deferred until it sells the goods to outsiders: $30\% \times 80 = 24$.

ABC's total 20X1 net income = $70 + (80 - 24) = 126$.

In 20X2, ABC sells the remaining 30 units at a price of 6 per unit, so its income from its own operations is $30 \times (6 - 5) = 30$. The deferral from the 20X1 inter-company transfer is now realized, so its total 20X2 net income is $30 + 24 = 54$.

For the two years combined, all the units have been resold. ABC's total net income = $126 + 54 = 180$, which is ABC's 40% share of XYZ's net income of $200 +$ ABC's own net income of 100.

Question: What are the accounting entries each year?

Answer: ABC's net income has two parts in each year:

- ! ABC's income from its own operations flows through net revenue and cost of goods sold: 70 in 20X1 and 30 in 20X2.
- ! ABC's share of XYZ's net income flow through income from investments in subsidiaries: 56 in 20X1 and 24 in 20X2.

Exercise 16.10: Equity method upstream sale

On December 31, 20X0, ABC buys 40% of XYZ for 660.

The book value of XYZ's net assets on 12/31/20X0 is 1,500. The fair values of its assets and liabilities are the same as the book values except for one fixed asset with a remaining useful life of 10 years whose fair value exceeds its book value by 100. XYZ uses straight line depreciation for its fixed assets.

In 20X1:

- ! XYZ has net income of 200 and pays dividends to shareholders of 25.
- ! XYZ sells inventory to ABC at a profit of 32.
- ! At December 31, 20X1, this inventory has not yet been sold to an outside party or used by ABC.

- A. What is the excess purchase price?
- B. How much of the excess purchase price is allocated to identifiable net assets?
- C. What is the goodwill implicit in the excess purchase price?
- D. What is the amortization of the excess purchase price in 20X1?
- E. What is the unrealized profit in the 20X1 equity income from ABC's investment in XYZ?
- F. What is the 20X1 equity income on ABC's income statement?
- G. What is ABC's investment in XYZ at December 31, 20X0?
- H. What are the dividends that ABC receives from XYZ in 20X1?
- I. What is ABC's investment in XYZ at December 31, 20X1?

Part A: The excess purchase price is the purchase price – ABC's portion of XYZ's identifiable net assets = $660 - 40\% \times 1,500 = 60$.

Part B: The excess of the fair value over the book value of XYZ's identifiable net assets is 100, so ABC's 40% portion is $40\% \times 100 = 40$.

Part C: Goodwill is the excess purchase price not allocated to identifiable net assets = $60 - 40 = 20$.

Question: Fair value is defined as market value. Why do the fair value and the market value differ?

Answer: Fair value is the market value (if an active market exists), so the fair value of XYZ's shares is their market price. This exercise considers the fair value of XYZ's identifiable net assets, which does not include many intangible assets (such as the knowledge of XYZ's employees) or business opportunities that XYZ may have. In addition, ABC may pay more than the fair value of the identifiable net assets if it expects benefits of synergy between its own operations and those of XYZ.

Part D: The excess purchase price allocated to the one identifiable net asset is amortized over 10 years or $40 / 10 = 4$ per year.

Part E: The profit from XYZ's 20X1 sales to ABC of 30 is divided into two parts:

- ! the portion from XYZ owned by others (not ABC) = $60\% \times 30 = 18$
- ! the portion from XYZ owned by ABC = $40\% \times 30 = 12$

The portion from XYZ owned by ABC is ABC selling goods to itself, so it is unrealized profit until ABC resells the goods to outside parties.

Part F: The 20X1 equity income on ABC's income statement is

- ABC's share of XYZ's net income = $40\% \times 200 = 80$
- the amortization of the excess purchase price allocated to identifiable net assets = -4

- the unrealized profit from the inter-company sale = -12
- = $80 - 4 - 12 = 64$.

Part G: ABC's investment in XYZ at December 31, 20X0, is the purchase price of 660.

Part H: XYZ paid dividends to shareholders of 25 in 20X1 and ABC owns 40% of XYZ, so ABC received dividends of $40\% \times 25 = 10$ from XYZ in 20X1.

Part I: ABC's investment in XYZ at December 31, 20X1, is

- 660 (ABC's investment in XYZ at December 31, 20X0)
- + 64 (the equity income from XYZ on ABC's 20X1 income statement)
- 10 (the dividends ABC received from XYZ in 20X1)
- = $660 + 64 - 10 = 714$.

Exercise 16.11: Equity method downstream sale

ABC owns 40% of XYZ. The annual amortization of the excess purchase price of XYZ allocated to identifiable net assets is 10.

In 20X1 ABC sells inventory with a cost of 75 to XYZ for 100. XYZ resells 80 of the inventory to outsiders in 20X1 and 20 in 20X2.

XYZ reports net income of 400 in 20X1 and of 500 in 20X2.

- A. What is the unrealized profit in ABC's 20X1 income from the inter-company sale to XYZ?
- B. What is the 20X1 equity income from the investment in XYZ on ABC's income statement?
- C. What is the 20X2 equity income from the investment in XYZ on ABC's income statement?

Part A: In 20X1, ABC sold inventory costing 75 to XYZ for 100 for a profit of $100 - 75 = 25$. XYZ resold 80 of the inventory to outsiders in 20X1, so $(100 - 80) / 100 = 20\%$ was not yet resold to outsiders. ABC owns 40% of XYZ, so the unrealized profit in 20X1 is $25 \times 40\% \times 20\% = 2$.

Part B: The annual amortization of the of the excess purchase price of XYZ allocated to identifiable net assets is 10, and XYZ reports net income of 400 in 20X1, so the 20X1 equity income from the investment in XYZ on ABC's income statement is

$$\begin{aligned} & 160 \text{ (ABC's share of XYZ's net income = } 40\% \times 400) \\ - & 10 \text{ (annual amortization of the of the excess purchase price)} \\ - & 2 \text{ (unrealized profit)} \\ = & 160 - 10 - 2 = 148. \end{aligned}$$

Part C: The 20X2 equity income from the investment in XYZ on ABC's income statement is

$$\begin{aligned} & 200 \text{ (ABC's share of XYZ's net income = } 40\% \times 500) \\ - & 10 \text{ (annual amortization of the of the excess purchase price)} \\ + & 2 \text{ (unrealized profit from 20X1 that is realized in 20X2)} \\ = & 200 - 10 + 2 = 192. \end{aligned}$$

Exercise 16.12: Upstream sale of inventory

ABC buys footballs produced in Asia from XYZ and re-sells them in Europe and Latin America.

On December 31, 20X1, XYZ has 1,000 shares outstanding for 10 per share. ABC buys 400 shares. Assume the fair value of XYZ's identifiable assets equals the book value of these identifiable assets.

In 20X2, ABC buys 5,000 footballs from XYZ for 1.00 each and sells 4,000 of them in Europe for 2.50 each. ABC sells the other 1,000 footballs in 20X3 in Latin America for 2.20 each. XYZ produces the footballs for 0.50 each and has a tax rate of 20%.

XYZ has net income of 3,000 in 20X2 and of 4,000 in 20X3. It pays shareholder dividends of 500 in both 20X2 and 20X3.

- A. What is ABC's asset "investment in associates" on December 31, 20X1?
- B. What is ABC's income from associates in 20X2?
- C. What is ABC's asset "investment in associates" on December 31, 20X2?
- D. What is ABC's income from associates in 20X3?
- E. What is ABC's asset "investment in associates" on December 31, 20X3?

Part A: ABC buys 400 shares at 10 apiece, so its investment in associates is 4,000 on December 31, 20X1.

Question: Why does the practice problem say that the fair value of XYZ's identifiable assets equals the book value of these identifiable assets?

Answer: If the fair value of XYZ's identifiable assets with finite useful lives did not equal their book value, ABC would depreciate its share of the excess portion over their useful lives. The income from associates in 20X3 and the investment in associates on December 31, 20X2, and December 31, 20X3, would be reduced by the excess depreciation.

Part B: If we ignore the inter-company transactions, XYZ has net income of 3,000 in 20X2 and of 4,000 in 20X3. ABC's share is 40%, or 1,200 in 20X2 and 1,600 in 20X3.

Some of the net income stems from XYZ's sales to ABC. These sales give XYZ pre-tax income in 20X2 of $5,000 \times (1.00 - 0.50) = 2,500$ and after-tax income (net income) of $2,500 \times (1 - 20\%) = 2,000$.

A firm's internal transactions do not affect its financial statements. If the firm's production department makes footballs at 0.50 each and gives them to the sales department, the firm shows no income statement entries, even if the production and sales departments value the footballs at different prices. If the sales department sells the footballs for 2.50 each, the income is earned when the footballs are sold.

We exclude the income from the in-house produced footballs until they are sold to third parties (consumers). XYZ is 40% owned by ABC, so we view the inter-company transactions as if 40% of each football is produced in-house and 60% is produced by a separate firm.

Of the 2,000 net income earned by XYZ from its sales to ABC, $40\% \times 2,000 = 800$ are in-house transactions and $60\% \times 2,000 = 1,200$ are transactions between separate firms.

If none of the 5,000 footballs bought by ABC from XYZ had been sold in 20X2, all 800 would be removed from the "income from associates" entry on ABC's income statement. But 4,000 of the footballs were sold in 20X2 to consumers in Europe:

- ! 80% of the inter-company transactions are fully earned and appear on ABC's financial statements.
- ! 20% of the 800 = 160 is removed and deferred until 20X3 when the footballs are sold in Latin America.

The income from associates in 20X2 is $1,200 - 160 = 1,040$.

Part C: In 20X2, ABC's investment in associates increases by 1,040 minus the shareholder dividends that ABC receives from XYZ, which are $40\% \times 500 = 200$.

On December 31, 20X2, ABC's investment in associates is $2,000 + 1,040 - 200 = 2,840$.

Part D: In 20X3, the remaining 1,000 footballs are sold to consumers in Latin America. The 160 of income that was deferred in 20X2 is recognized in 20X3. Combining the 160 with ABC's share of XYZ's 20X3 net income gives $4,000 \times 40\% + 160 = 1,760$.

Part E: In 20X3, ABC's investment in associates increases by 1,760 minus the shareholder dividends that ABC receives from XYZ, which are $40\% \times 500 = 200$.

On December 31, 20X2, ABC's investment in associates is $2,840 + 1,760 - 200 = 4,400$.

Exercise 16.13: Downstream sale

ABC produces footballs in Asia and sells them to XYZ, which re-sells them in Europe and Latin America.

On December 31, 20X1, XYZ has 1,000 shares outstanding for 10 per share. ABC buys 400 shares. Assume the fair value of XYZ's identifiable assets equals the book value of these identifiable assets.

In 20X2, ABC sells 5,000 footballs to XYZ for 2.00 each, who re-sells 4,000 of them in Europe for 2.50 each. XYZ resells the other 1,000 footballs in 20X3 in Latin America for 2.25 each. XYZ has a tax rate of 20%. ABC's cost of producing the footballs is 0.50 each.

XYZ has net income of 3,000 in 20X2 and of 4,000 in 20X3. It pays shareholder dividends of 500 in both 20X2 and 20X3.

- A. What is ABC's asset "investment in associates" on December 31, 20X1?
- B. What is ABC's income from associates in 20X2?
- C. What is ABC's asset "investment in associates" on December 31, 20X2?
- D. What is ABC's income from associates in 20X3?
- E. What is ABC's asset "investment in associates" on December 31, 20X3?

Part A: ABC buys 400 shares at 10 apiece, so its investment in associates is 4,000 on December 31, 20X1.

Part B: If we ignore the inter-company transactions, XYZ has net income of 3,000 in 20X2 and of 4,000 in 20X3. ABC's share is 40%, or 1,200 in 20X2 and 1,600 in 20X3.

Some of the net income stems from XYZ's sales to ABC. These sales give XYZ pre-tax income in 20X2 of $5,000 \times (1.00 - 0.50) = 2,500$ and after-tax income (net income) of $2,500 \times (1 - 20\%) = 2,000$.

A firm's internal transactions do not affect its financial statements. If the firm's production department makes footballs at 0.50 each and gives them to the sales department, the firm shows no income statement entries, even if the production and sales departments value the footballs at different prices. If the sales department sells the footballs for 2.50 each, the income is earned when the footballs are sold.

We exclude the income from the in-house produced footballs until they are sold to third parties (consumers). XYZ is 40% owned by ABC, so we view the inter-company transactions as if 40% of each football is produced in-house and 60% is produced by a separate firm.

Of the 2,000 net income earned by XYZ from its sales to ABC, $40\% \times 2,000 = 800$ are in-house transactions and $60\% \times 2,000 = 1,200$ are transactions between separate firms.

If none of the 5,000 footballs bought by ABC from XYZ had been re-sold in 20X2, all 800 of the inter-company transactions would be removed from the "income from associates" entry on ABC's income statement. But 4,000 of the footballs were re-sold in 20X2 to consumers in Europe:

- ! 80% of the in-house transactions are fully earned and appear on ABC's financial statements.
- ! 20% of the 800 = 160 is removed and deferred until 20X3 when the footballs are sold in Latin America.

The income from associates in 20X2 is $1,200 - 160 = 1,040$.

Part C: In 20X2, ABC's investment in associates increases by 1,040 minus the shareholder dividends that ABC receives from XYZ, which are $40\% \times 500 = 200$.

On December 31, 20X2, ABC's investment in associates is $2,000 + 1,040 - 200 = 2,840$.

Part D: In 20X3, the remaining 1,000 footballs are sold to consumers in Latin America. The 160 of income that was deferred in 20X2 is recognized in 20X3. Combining the 160 with ABC's share of XYZ's 20X3 net income gives $4,000 \times 40\% + 160 = 1,760$.

Part E: In 20X3, ABC's investment in associates increases by 1,760 minus the shareholder dividends that ABC receives from XYZ, which are $40\% \times 500 = 200$.

On December 31, 20X2, ABC's investment in associates is $2,840 + 1,760 - 200 = 4,400$.