FA Module 15: Financial investments – practice problems

(The attached PDF file has better formatting.)

Exercise 15.1: Financial investments

(This exercise combines financial investments, the equity method, and the acquisition method.)

- AFS = available for sale
- HFT = held for trading
- EQM = equity method
- ACQ = acquisition method

Other exercises have detailed review of these four methods of accounting for inter-corporate investments.

Firms AFS, HFT, EQM, and ACQ each have 100 shares outstanding on December 31, 20X0, and selling for 10 per share. For all firms, the fair value of identifiable net assets = the book value of identifiable net assets.

ABC buys 15 AFS shares, 15 HFT shares, 40 EQM shares, 70 ACQ shares. ABC has no other operations. ABC classifies AFS as available for sale and HFT as held for trading.

The table below shows the firms' net income in 20X1, shareholder dividends in 20X1, and market value per share on December 31, 20X1. The corporate tax rate is zero.

Firm	*AFS*	*HFT*	*EQM*	*ACQ*
net income during 20X1	300	300	300	300
shareholder dividends paid in 20X1	60	60	60	60
stock price at December 31, 20X1	12	12	12	12

What is ABC's net income in 20X1?

Solution 15.1: We compute ABC's net income from each financial investment.

AFS: Net income = shareholder dividends = 60 × 15/100 = 9. The change in the stock price of 15 × (12 – 10) = 30 is other comprehensive income, not net income.

HFT: Net income = shareholder dividends + the change in the stock price = 9 + 15 × (12 – 10) = 39.

EQM: ABC's net income is its share of EQM's net income = 300 × 40/100 = 120. ABC's dividends received of 60 × 40/100 = 24 is a cash inflow but it is included in its share of EQM's net income. The dividends move 24 from "investment in EQM" to cash on ABC's balance sheet.

ACQ: ABC shows 300 of net income from EQM's operations on its balance sheet and a non-controlling (minority) interest of 300 × (1 – 70%) = 90. The non-controlling (minority) interest is subtracted from the total net income to give ABC's share as 210.

Exercise 15.2: Bond cash flows

A firm owns a bond classified as held to maturity.

- The bond's carrying value is 112 on 12/31/20X1 and 108 on 12/31/20X2.
- The firm reports interest earned on the bond of 45 for 20X2.

A. What is the amortization of premium on the bond in 20X2?
B. What is the cash flow from the bond reported on the cash flow statement?

Part A: The amortization of premium in 20X2 is 108 – 112 = –4

Part B: Interest income is coupon payments received minus amortization of premium (or plus accrual of discount), so cash flow is interest income plus amortization of premium: 45 + (108 – 112) = 41.

Exercise 15.3: Cash flows

A firm issues a corporate bond in 20X1.

- The bond's carrying value is 82 on 12/31/20X1 and 84 on 12/31/20X2.
- The firm reports interest expense of 47 for 20X2.

A. What is the accrual of discount on the bond in 20X2?
B. What is the cash flow from the bond reported on the cash flow statement?

Solution 15.3:

Part A: The accrual of discount on the bond in 20X2 is 84 – 82 = 2.

Part B: Interest expense is coupon payments plus accrual of discount, so cash flow is interest income minus accrual of discount: 47 – (84 – 82) = 45.

Bond amortization

Question: How does bond amortization affect the indirect method of forming the cash flow statement?

Answer: Bond amortization has four forms:

	Amortization of bond premium	Accrual of bond discount
Firm owns bond (investing)	cash inflow = income + amortization	cash inflow = income – accrual
Firm issues bond (financing)	cash outflow = expense + amortization	cash outflow = income – accrual

Some people speak amortization of a bond premium and accrual of a bond discount. The textbook uses the term amortization for both bond premiums and bond discounts. Both usages are common.

- If the yield to maturity of bond is greater than the coupon rate, the bond sells at a discount.
- If the yield to maturity of bond is less than the coupon rate, the bond sells at a premium.

The carrying value of the bond on the balance sheet is the par value plus the premium or minus the discount.

Question: Why do bonds sell at premiums or discounts?

Answer: Bonds sell at premiums or discounts because of changes in interest rates or credit risk. We show both scenarios in the illustrations here.

Illustration #1: A firm buys a 100 par value bond that was issued last year with a 6% coupon rate and it classifies the bond as held to maturity.

- Interest rates have risen and the same bond would be issued now with an 8% coupon rate. <OR>
  - The firm's credit risk has increased and the bond would be issued now with an 8% coupon rate.
- The bond pays less interest than it would pay were it issued now, so it sells at a discount (value is lower).
- The carrying value of the bond is the par value *minus* the discount.
- The cash interest received each year is the par value × the coupon rate = 100 × 6% = 6.
- The interest income each year is the cash received + the accrual of the discount.
  - The cash received = the interest income each year – the accrual of the discount.
- The firm uses constant yield amortization, so the investment yield each year is 8% of the carrying value.

- Interest rates have decreased and the same bond would be issued now with a 4% coupon rate <OR>
  - The firm's credit risk has decreased and the bond would be issued now with a 4% coupon rate.
- The bond pays more interest than it would pay were it issued now, so it sells at a premium (higher value).
- The carrying value of the bond is the par value *plus* the premium.
- The cash interest received each year is the par value × the coupon rate = 100 × 6% = 6.
- The interest income each year is the cash received – the amortization of the premium.
  - The cash received = the interest income each year + the amortization of the premium.
- The firm uses constant yield amortization, so the investment yield each year is 4% of the carrying value.

Interest income is an addition to pre-tax income. If the firm treats interest received as an operating cash flow, the indirect method of forming the cash flow statement subtracts the accrual of the discount and adds the amortization of the premium to net income.

Illustration #2: A firm issues a 100 par value bond with a 6% coupon rate.

- Interest rates have decreased between the date the bond indenture was printed and the date the bond was sold. The same bond would be issued now with a 4% coupon rate. <OR>
  - The firm's credit risk has decreased between the date the bond indenture was printed and the date the bond was sold. The same bond would be issued now with a 4% coupon rate.

- The bond pays more interest than it would pay with a 4% coupon rate, so it sells at a premium.
- The carrying value of the bond is the par value plus the premium.
- The interest paid each year is the par value × the coupon rate = 100 × 6% = 6.
- The interest expense each year is the cash paid – the amortization of the premium.
  - The cash paid = the interest expense each year + the amortization of the premium.
- The firm uses constant yield amortization, so the interest expense each year is 4% × the carrying value.

- Interest rates have increased between the date the bond indenture was printed and the date the bond was sold. The same bond would be issued now with an 8% coupon rate. <OR>
  - The firm's credit risk has increased between the date the bond indenture was printed and the date the bond was sold. The same bond would be issued now with an 8% coupon rate.
- The bond pays less interest than it would pay with an 8% coupon rate, so it sells at a discount.
- The carrying value of the bond is the par value minus the premium.
- The interest paid each year is the par value × the coupon rate = 100 × 6% = 6.
- The interest expense each year is the cash paid + the accrual of the discount.
  - The cash paid = interest expense each year is – the accrual of the discount.
- The firm uses constant yield amortization, so the interest expense each year is 8% × the carrying value.

Interest expense is a subtraction from net income. If the firm uses the indirect method of forming the cash flow statement, it subtracts amortization of the premium from net income and adds accrual of the discount to net income. The textbook says (page 270): amortization of bond discount = addition to net income for indirect method; the terms differ, but the intuition is the same.

Accrued interest

Question: Is accrued interest an asset or a liability?

Answer: Accrued interest is an asset for the holder of the bond and a liability for the issuer of the bond.

- Firm Y issues a semi-annual 8% coupon 100 par value bond on April 1, 20X1, with coupon payments on March 31 and September 30 of each year.
- Firm Z buys the bond on April 1, 20X1, at its par value.

On December 31, 20X1, the Firm Y shows:

- interest paid (on September 30, 20X1) of ½ × 8% × 100 = 4
- accrued interest (a liability) for three months of ¼ × 8% × 100 = 2
- interest expense of 4 + 2 = 6

On December 31, 20X1, the Firm Z shows:

- interest received (on September 30, 20X1) of ½ × 8% × 100 = 4
- accrued interest (an asset) for three months of ¼ × 8% × 100 = 2
- interest income of 4 + 2 = 6

For the indirect method of forming the cash flow statement, Firm Y shows:

- interest received = interest income – Δ(accrued interest asset)

Firm Z's formula depends on whether it shows interest paid and interest expense as positive or negative:

- Negative figures: interest paid = interest expense + Δ(accrued interest liability)
- Positive figures: interest paid = interest expense – Δ(accrued interest liability)

Exercise 15.4: Interest expense and accrued interest

On April 1, 20X1, a firm issues long-term debt of 100 with 8% semi-annual coupon payments. The firm pays coupons of 4 each April 1 and October 1.

A. What is the accrued interest expense on December 31, 20X1?
B. What is the interest expense for 20X1?
C. What is the interest expense for 20X2?

Part A: On December 31, 20X1, the firm shows interest paid of 4 on the cash flow statement. The interest of 2 for the last three months of 20X1 is accrued but not paid yet, so it appears as an accrued interest liability on the balance sheet.

Part B: The interest expense for 20X1 is interest paid + the change in the accrued interest liability = 4 + (2 – 0) = 6.

Part C: In 20X2, the firm pays interest of 4 on April 1 and 4 on October 1. The accrued interest liability is 2 on January 1, 20X2, and 2 on December 31, 20X2. The interest expense is 4 + 4 + (2 – 2) = 8.

Question: Is the accrued interest always a liability?

Answer: The accrued interest expense is a liability; the accrued interest income is an asset. If one party has an accrued interest liability, another party has an accrued interest asset.

Exercise 15.5: Interest income and accrued interest

On April 1, 20X1, a firm buys a ten year 100 par value bond with 8% semi-annual coupon payments. The bond pays coupons of 4 each April 1 and October 1.

A. What is the accrued interest income on December 31, 20X1?
B. What is the interest income for 20X1?
C. What is the interest income for 20X2?

Part A: On December 31, 20X1, the firm shows interest received of 4 on the cash flow statement. The interest of 2 for the last three months of 20X1 is accrued but not yet received, so it appears as an accrued interest asset on the balance sheet.

Part B: The interest income for 20X1 is interest received + the change in the accrued interest asset = 4 + (2 – 0) = 6.

Part C: In 20X2, the firm receives interest of 4 on April 1 and 4 on October 1. The accrued interest asset is 2 on January 1, 20X2, and 2 on December 31, 20X2. The interest income is 4 + 4 + (2 – 2) = 8.

Question: Might a firm have both an accrued interest asset and an accrued interest liability?

Answer: Yes: if the firm issues debt but not on December 31, it has an accrued interest liability. If the firm buys bonds that pay coupons on dates other than December 31 and June 30, it has an accrued interest asset.