FINM2063 Introduction to Finance

Chapter 2 Exercises

Solutions

1. This problem illustrates the future value of a sum of an annuity except the amount of the annual contribution is the unknown and the future sum is known.

X(28.132) = $200,000

x = $200,000/28.132 = $7,109

(28.132 is the interest factor for the future sum of an

annuity of $1 at 5% for eighteen years.)

(PV = 0; N = 18; I = 5; PMT = ?; and FV = 200000;

PMT = -7109.)

If Holly can increase the return to 7 percent, the required annual contribution decreases by $7,109 – 5,883 = $1,226.

X(33.999) = $200,000

x = $200,000/33.999 = $5,883

(33.999 is the interest factor for the future sum of an

annuity of $1 at 5% for eighteen years.)

(PV = 0; N = 18; I = 7; PMT = ?; and FV = 200000;

PMT = -5883)

1. To answer this question, determine the amount that can be

withdrawn:

$93,000 = X(PVAIF)

$93,000 = X(7.360)

X = $12,636

(PV = 93000; N = 10; I = 6; PMT = ?; and FV = 0;

PMT = -12,636.)

She can only withdraw $12,636 for ten years.

If she earns 9 percent, she can withdraw $14,000:

$93,000 = X(PVAIF)

$93,000 = X(6.418)

X = $14,490.50

(PV = 93000; N = 10; I = 9; PMT = ?; and FV = 0;

PMT = -14491.)

At 9 percent she can withdraw annually $14,000 for ten years.

1. This problem is an introduction to valuation. It asks the student to determine the present value of a series of future payments (i.e., illustrates discounted cash flow):

X = $10,000/1.10 + ... + 10,000/1.1025

X = $10,000(9.077) = $90,770

(9.077 is the interest factor for the present value of

an annuity of $1 at 10% for 25 years.)

(PV = ?; N = 25; I = 10; PMT = 10000; and FV = 0.

PV = -90770.)

If this investment costs $100,000, it is overpriced and should not be purchased, since it is worth only $90,770.

If the investor can only earn 7 percent, the present value is

X = $10,000 + ... + 10,000

(1 + .07) (1 + .07)25

X = $10,000(11.654) = $116,540

(11.654 is the interest factor for the present value of

an annuity of $1 at 7% for 25 years.)

(PV = ?; N = 25; I = 7; PMT = 10000; and FV = 0.

PV = -116536.)

The present value now exceeds the cost and should be purchased. Notice that the answers in both 6 and 7 change from NO to YES with the change in the interest rate.

1. Amount of the mortgage: $250,000 - $50,000 = $200,000

a. The periodic payment required by the mortgage:

$200,000(PVAIF) = X

X = 200,000/12.462 = $16,049

(PV = 200000; N = 20; I = 5; PMT = ?; and FV = 0. PMT = -16049)

b. Interest: $200,000 x .05 = $10,000

c. Principal repayment: $16,049 - $10,000 = $6,049

d. Balance owed is $200,000 - $6,049 = $193,951.

Interest: $193,951(.05) = $9,698

e. Principal repayment: $16,049 - $9,698 = $6,351

Balance owed at the end of the second year:

$193,951 – 6,351 = $187,600

f. Since the interest payments are based on the balance owed, the annual reduction in the amount owed reduce each subsequent interest payment.

1. This problem reverses the previous problem in which payments reduce the principal in the IRA. In both problems the principal (owed or owned) is $200,000; the number of years is 20, and the rate of interest (or the rate earned) is 5 percent.

a. The annual withdrawal:

$200,000(PVAIF) = X

X = 200,000/12.462 = $16,048

(PV = 200000; N = 20; I = 5; PMT = ?; and FV = 0. PMT = -16048)

b. The return on the initial investment:

$200,000 x .05 = $10,000

The balance of the withdrawal reduces the funds

in the account by $16,048 - $10,000 = $6,048.

c. The balance in the account:

$200,000 - $6,048 = $193,952.

d. Return earned on the balance during the second year:

$193,952(.05) = $9,698

e. The payment reduces the balance in the account by

$16,048 - $9,698 = $6,350.

The balance in the account at the end of the second year:

$193,952 – 6,350 = $187,602

f. In problem 4, the individual makes the mortgage payments and periodically reduces the loan until it is completely repaid. In problem 5, the individual withdraws funds from the IRA and over time the amount in the account is reduced to $0. The two problems are a reverse of the same basic concept.

1. Determine the present value of each investment alternative:

A: $35,000(3.170) = $110,950

(PV = ?; N = 4; I = 10; PMT = 35,000; and FV = 0. PV = -110945.)

B: $157,400(.683) = $107,504

(PV = ?; N = 4; I = 10; PMT = 0; and FV = 157400. PV = -107506.)

The first alternative has the larger present value and is preferred. This problem may be used to introduce the concept of mutually exclusive investments and the need to choose alternatives.

By varying the cost of funds, the second alternative may be preferred. For example at 7 percent B is preferred:

$35,000(3.387) = $118,545

$157,400(0.763) = $120,096.

1. a. *First City Bank:* Effective rate = 7%.

*Second City Bank:*



You would choose the First City Bank.

b. If funds must be left on deposit until the end of the compounding period (one year for First City and one quarter for Second City), and you think there is a high probability that you will make a withdrawal during the year, the Second City account might be preferable. For example, if the withdrawal is made after 10 months, you would earn nothing on the First City account but (1.01625)3 - 1.0 = 4.95% on the Second City account.

1. Bank A’s effective annual rate is 8.24 percent:



Now Bank B must have the same effective annual rate:



Thus, the two banks have different quoted rates—Bank A’s quoted rate is 8 percent, while Bank B’s quoted rate is 7.94 percent; however, both banks have the same effective annual rate of 8.24 percent. The difference in their quoted rates is due to the difference in compounding frequency.