3-7

*Time Value of Money* means simply that “money has value over time.” Money has value, of course, because of what it can purchase. However, the time value of money means that ownership of money is valuable, and it is valuable because of the interest dollars that can be earned/gained due to its ownership. Understanding interest and its impact is important in many life circumstances. Examples could include some of the following:

* Selecting the best loans for homes, boats, jewelry, automobiles, etc.
* Many aspects involved with businesses ownership (payroll, taxes, etc.)
* Using the best strategies for paying off personal loans, credit cards, debt
* Making investments for life goals (purchases, retirement, college, weddings, etc.).

3-16

Use *P* = *F (P/F*, *i*, *n*) = *F* (1 + *i*)–*n* = 20,000 (1 + 0.07)–*n*.

(a) *n* = 5, *P* = $14,260

(b) *n* = 10, *P* = $10,167

(c) *n* = 20, *P* = $5,168

(d) *n* = 50, *P* = $679

3-21

*n* = 63 years

*i* = 7.9%

*F* = $175,000

*P = F* (1 + *i*)−*n*

= $175,000 (1.079)−63

= $1,454

3-24

*F* =$8,250

*n* = 4 semi-annual periods

*i* = 4%

Find *P.*

*P = F* (1+*i*)–*n* = $8,250 (1.04)–4 = $8,250 (0.8548)

= $7,052.10

Using interest tables:

*P = F (P/F,* 4%, 4) = $8,250 (0.8548)

= $7,052.10

3-28

Local Bank

*F* = $3,000 (*F/P*, 5%, 2) = $3,000 (1.102)

= $3,306

Out of Town Bank

*F* = $3,000 (*F/P*, 1.25%, 8) = $3,000 (1.104)

= $3,312

Additional Interest = $6

3-34

Effective Interest Rate = (1 + *i*)*m* − 1 = (1.03)4 − 1 = 0.1255 = 12.55%

3-41

*F* = *P* (1 + *i*)*n* = 0.98*F* (1 + *i*)1

*i* = (1.00/0.98) − 1

= 0.0204 = 2.04%

*i*eff = (1 + *i*)*m* − 1 = (1.0204)365/20 − 1

= 0.4456 = 44.6%

3-48

Bank North

*F = P* (1 + *i*)*n* = $10,000 (1 + (0.065/365))365 = $10,671.53

Bank South

*F = P* em = $10,000 e(.065×1) = $10,671.59

Difference = $0.06

3-52

*P* = $10,000, *F* = $30,000, *i* = 5%, *n* = ?

*F = P*em

$30,000 = $10,000 e(0.05)*n*

0.05 *n* = In ($30,000/$10,000) = 1.0986

*n* = 1.0986/0.05

= 21.97 years

3-56

For rate *i*:



For rate 2*i*:



Thus, the cash flow in diagram *i* is more valuable than the cash flow in diagram *ii*.

Example: Let *F*1 = 1000 and *i* = 10% then *F*2 = (1000)(1 + 0.1)1 = 1100.

At *i* = 2*i* = 20% have: *P*′1 = 1000 (1 + 0.2)–2 = 694.4

*P*′2 = 1100 (1 + 0.2)–3 = 636.6

3-63

(a) Interest Rate per 6 months = $20,000/$500,000= 0.0400 = 4%

Effective Interest Rate per yr. = (1 + 0.04)2 – 1 = 0.0816

= 8.16%

(b) For continuous compounding:

*F = P*em

$520,000 = $500,000 er(1)

*r* = In ($520,000/$500,000) = 0.0392

= 3.92% per 6 months

Nominal Interest Rate (per year) = 3.92% (2) = 7.84% per year