

Chapter 2: Borrowing Money



When a Loan Is an Investment

Doris works as a personal loan manager at a bank. It is her job to decide whether the bank should lend money to a customer. When she approves a loan, she thinks of it as the bank making an investment in the person who is borrowing the money. Doris is considering a loan application from Leandro, who wants to borrow \$10 000 to renovate his garage so that he can use it as a workshop. She expects the money borrowed plus interest to be repaid as a single payment at the end of 2 years. She is considering the following three loan options for Leandro:

- Option A: A loan at 6% simple interest
 Option B: A loan at 5.5% compound interest with annual compounding
 Option C: A loan at 5% compound interest with semi-annual compounding

7 Which option is most beneficial for the bank, and which is most beneficial for Leandro?

- A. Why do you think Doris considers a bank loan as an investment? → money in the form of interest she makes
- B. Identify the following for the three loan options:
- The principal → \$10 000
 - The term → 2 yrs
 - The type of interest, the interest rate, and the compounding frequency → see options A, B & C

- C. Why is it difficult to predict which option is most beneficial to the bank or to Leandro? rates are similar and term is short
- D. For option A, how much would Leandro need to repay at the end of the term? How much of this amount is interest?

$$FV = P + Prt$$

$$= 10000 + 10000(0.06)(2) = 11200$$

\$ I = 1200 \$

- E. For option B, how much would Leandro need to repay? How much of this amount is interest?

$$FV = P(1+i)^n$$

$$= 10000(1+0.055)^2 = 11130.25$$

I = 1130.25 - 10000 = 1130.25 \$

- F. For option C, how much would Leandro need to repay? How much of this amount is interest?

$$FV = P(1+i)^n$$

$$= 10000 \left(1 + \frac{0.05}{2}\right)^{2 \times 2}$$

$$= 11038.13$$

I = 1038.13 \$

N = 4 (# of periods)
 I = 5 when pmt = 0
 PV = 10000
 Pmt = 0
 FV = -11038.13 \$
 P/Y = C/Y w. 1 pmt = 0
 C/Y = 2

G. Which of the three options is most beneficial for the bank? Which is most beneficial for Leandro? Explain.

Bank \rightarrow (A)
most interest paid

Leandro \rightarrow (C)
least interest paid

H. Consider a fourth loan option:

Option D: A loan at 5% interest, compounded semi-annually, with payments of \$2658.18 at the end of every 6-month period for 2 years

i) Complete the following table to show the repayment of the loan.

Payment Period	Payment (\$)	Interest Paid (\$) $\left[\text{Balance} \cdot \left(\frac{0.05}{2} \right) \right]$	Principal Paid (\$) [Payment - Interest]	Balance (\$) [Balance - Principal Paid]
0			2658.18 - 250 = 2408.15	10000.00
1	2658.18	\$250	2468.38	7591.85
2	2658.18	\$189.80	2530.09	5123.47
3	2658.18	\$128.09	2593.35	2593.38
4	2658.18	\$64.83		0.03
Total	10632.72	\$632.72	\$9999.97	

ii) What do you notice about the pattern in the values in each column? What other relationships do you notice in the table?

interest owing decreases with each payment. The amount paid to the principal increases essentially paid off

I. Which of the four options is most beneficial for the bank? Which is most beneficial for Leandro? Explain.

Bank \rightarrow (A) } but it's
more interest } higher risk

Leandro \rightarrow (D)

Decide whether you agree or disagree with each statement. Explain your decision.

1. When the interest rate on a loan increases, the total interest charged also increases.
2. Early in the term of a loan with regular payments, most of each payment goes toward paying off the interest charged. The rest goes toward paying off the principal. Later in the term, most of each payment goes toward paying off the principal.
3. The loan or credit option that results in the least interest charged is the best choice for the borrower.
4. It is better to pay cash to purchase an item than to use credit.
5. It is better to buy than to rent.

In Summary

Key Ideas

- The large majority of commercial loans are compound interest loans, although simple interest loans are also available.
- The cost of a loan is the interest charged over the term of the loan.
- A loan can involve regular loan payments over the term of the loan or a single payment at the end of the term.
- The same formulas that are used for investment situations are also used for loans with a single payment at the end of the term:
 - For a loan that charges simple interest, $A = P + Prt$ or $A = P(1 + rt)$
 - For a loan that charges compound interest, $A = P(1 + i)^n$
- Technology can be used to determine unknown variables in compound interest loan situations for both single payment loans and regular payment loans.

Need to Know

- The interest that is charged on a loan will be less under any or all of these conditions:
 - The interest rate is decreased.
 - The interest compounding frequency is decreased.
 - Regular payments are made.
 - The regular payment amount is increased.
 - The payment frequency is increased.
 - The term is decreased.
- An amortization table is a payment schedule for a loan with regular payments. It shows what happens in each payment period. It shows the amount of each payment, the interest and the principal portion of each payment, and the balance of the loan. An amortization table can be created with spreadsheet software.

Payment Period	Payment (\$)	Interest Paid (\$)	Principal Paid (\$)	Balance (\$)
0				
1				
2				

- With each payment period, the interest paid decreases while the principal paid increases. This occurs because each payment decreases the balance of the loan, so the interest on the remainder of the balance will be less on the next payment. Also, because the payment amount stays the same, more of the payment goes toward paying off the principal, since less is being paid toward the interest.
- Technology can be used to investigate and analyze "what if" situations that involve borrowing money.