

BUAD 340 Principles of Finance Fall 2018/Dr. Minor Time Value of Money Handout 181003

Purpose	Calculator Key	Excel Function
Solve for Number of Periods	N	NPer (rate, pmt, pv, fv, type)
Solve for periodic interest rate	I/Yr	Rate (nper, pmt, pv, fv, type, guess)
Solve for present value	PV	PV (rate, nper, pmt, fv, type)
Solve for annuity payment	PMT	PMT (rate, nper, pv, fv, type)
Solve for future value	FV	FV (rate, nper, pmt, pv, type)

Solving TVM Problems

1. Read problem thoroughly
2. Create a time line
3. Put cash flows and arrows on time line
4. Determine if it is a PV, FV, or Annuity (PMT) problem
5. Determine if solution involves a single CF, annuity stream(s), or mixed flow
6. Solve the problem

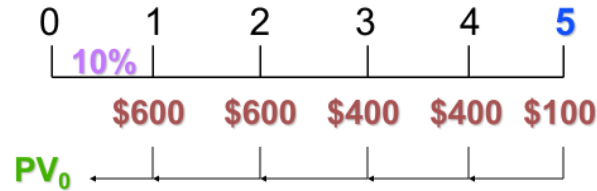
Is it a PV, FV, or Annuity (PMT) problem?

- ❖ Suppose that you have \$100 to invest for a period of 5 years at an interest rate of 10% per year. How much will you have accumulated at the end of this time period? **\$161.05**
- ❖ Suppose that you are planning to send your daughter to college in 18 years. Furthermore, assume that you have determined that you will need \$100,000 at that time in order to pay for tuition, room and board, party supplies, etc. If you believe that you can earn an average annual rate of return of 8% per year, how much money would you need to invest today as a lump sum to achieve your goal? **\$25,024.90**
- ❖ Suppose that you will be borrowing \$1000 each year for 10 years at a rate of 9%, and then paying back the loan immediate after receiving the last payment. How much would you have to repay? **\$15,192.93**
- ❖ Suppose that you have \$1,250 today and you would like to know how long it will take you double your money to \$2,500. Assume that you can earn 9% per year on your investment. **8.04**
- ❖ What is the present value of Janet's IRA if she deposits \$1000 annually with an annual return of 5 percent 12 years from now? **\$8,863.25**
- ❖ Suppose that you are planning to send your daughter to college in 18 years. Furthermore, assume that you have determined that you will need \$100,000 at that time in order to pay for tuition, room and board, party supplies, etc. If you have \$20,000 to invest today, what compound average annual rate of return do you need to earn in order to reach your goal? **9.35%**

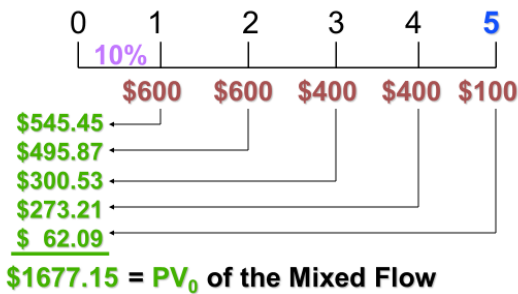
Mixed Cash Flow (Van Horne Chapter 3)

In the real world, you won't always have equal payments in a financial calculation. These unequal payments are a mixed cash flow.

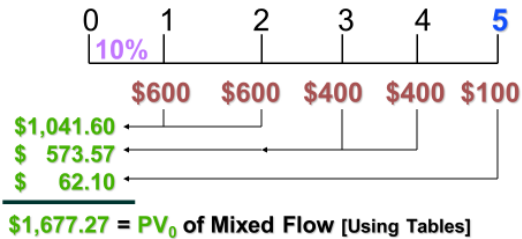
Example: Julie Miller will receive the set of cash flows below. What is the Present Value at a discount rate of 10%. You may solve a "piece-at-a-time" or "group-at-a-time."



Piece-at-a-Time using the PV Function:



Group-at-a-Time Using the NPV Function:



Steps to Amortizing a Loan

1. Calculate the payment per period.
2. Determine the interest in Period t. ($Loan\ Balance\ at\ t-1 \times (i\% / m)$)
3. Compute principal payment in Period t. ($Payment - Interest\ from\ Step\ 2$)
4. Determine ending balance in Period t. ($Balance - principal\ payment\ from\ Step\ 3$)
5. Start again at Step 2 and repeat.

Continuous Compounding

Continuous compounding rate problem. Find the Effective Annual Rate (EAR) = $e^r - 1$; in Excel: =EXP(rate)-1. Then use the EAR as the rate in your Excel FV formula. What is the EAR on your credit card with continuous compounding if the APR is 18%?

$$\begin{aligned} \square \text{ EAR} &= e^{.18} - 1 \\ &= 1.1972 - 1 \\ &= \mathbf{.1972 \text{ or } 19.72\%} \end{aligned}$$

Friday: Van Horne Chapter 4 The Valuation of Long-Term Securities (Stocks and Bonds)