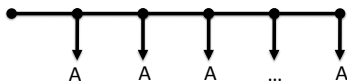


Modeling Compound Growth in Excel Part 4 : Evaluating Variable Flows

Robert Muller
CS 021 Computers in Management
Boston College

An Annuity is a Sequence
of **Equal** Cash Flows

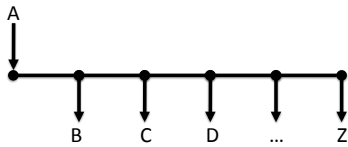


2/5/10

CS 021 Computers in Management

2

Evaluating Sequences of **Unequal** Flows



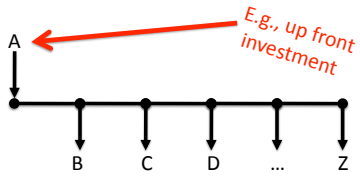
Where in general $A \langle > B \langle > C \langle > D \langle > \dots \langle > Z$.

2/5/10

CS 021 Computers in Management

3

Evaluating Sequences of Unequal Flows



Where in general $A < B < C < D < \dots < Z$.

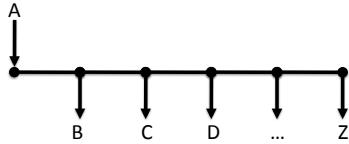
2/5/10

CS 021 Computers in Management

4

PV of a Sequence of Unequal Flows

$$PV = A + B/(1+i) + C/(1+i)^2 + D/(1+i)^3 + \dots + Z/(1+i)^n$$



2/5/10

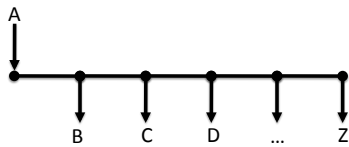
CS 021 Computers in Management

5

PV of a Sequence of Unequal Flows

$$PV = A + B/(1+i) + C/(1+i)^2 + D/(1+i)^3 + \dots + Z/(1+i)^n$$

$$= A + PV(i, 1, -B) + PV(i, 2, -C) + \dots + PV(i, n, -Z)$$



2/5/10

CS 021 Computers in Management

6

PV of a Sequence of Unequal Flows

$$\begin{aligned}
 PV &= A + B/(1+i) + C/(1+i)^2 + D/(1+i)^3 + \dots + Z/(1+i)^n \\
 &= A + PV(i, 1, -B) + PV(i, 2, -C) + \dots + PV(i, n, -Z) \\
 &= A + NPV(i, B, C, D, \dots, Z)
 \end{aligned}$$

2/5/10 CS 021 Computers in Management 7

Net Present Value

NPV(DiscountRate, Future Flows)

2/5/10 CS 021 Computers in Management 8

Net Present Value

NPV(DiscountRate, Future Flows)

If the NPV of a sequence of future flows is positive, then the investment yields a better return than that obtained using the DiscountRate.

2/5/10 CS 021 Computers in Management 9

“Net” Present Value

Present Value:

$$NPV(i, B, C, D, \dots, Z)$$

Net Present Value:

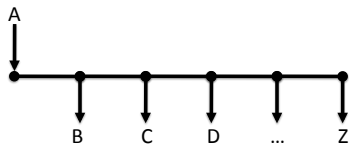
$$A + NPV(i, B, C, D, \dots, Z)$$

2/5/10

CS 021 Computers in Management

10

Given a Sequence of Unequal Flows
what is the Rate of Return?



Where in general $A \lt B \lt C \lt D \lt \dots \lt Z$.

2/5/10

CS 021 Computers in Management

11

Internal Rate of Return

$$IRR(\text{Future Flows, guess})$$

Some flows must be negative and some must be positive.

2/5/10

CS 021 Computers in Management

12

IRR(A1:A4, 15%) gives 23%

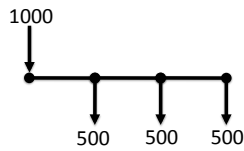
◇	A
1	-1000
2	500
3	500
4	500
5	

2/5/10

CS 021 Computers in Management

13

$NPV(IRR(\text{flows}), \text{flows}) = 0$



IRR computes the rate such that the sum of the PVs of all but the first flow is the complement of the first flow.

2/5/10

CS 021 Computers in Management

14

Examples

2/5/10

CS 021 Computers in Management

15
