

## Using Excel's Financial Wizard (by Ali Aslam):

The Function Wizard button is a great place to access financial functions. The advantage of the Function Wizard is that it gives you the order of the arguments.

Step 1: Begin by clicking on the "Function Wizard" button. The "Function Wizard" is  $f_x$  key located on the top banner of the Excel screen. The top banner is located underneath the pull-down tabs: *File, Edit, View, Insert, etc.*

OR:

You can also access the "Financial Wizard" by choosing the Insert pull-down tab and selecting the " $f_x$  Function..." key. The next prompt will allow you to choose among various functions. Choosing "Financial" will then allow you to choosing from among financial functions.

Step 2:

1. Choose "Financial" as the function category on the left-side of the box prompt. This box will be labeled "Step 1 of 2." Next choose the desired function (PMT, PV, IRR, etc.) on the right-side of the box. Note that the list of arguments and a brief description of the function are shown at the bottom of the dialog box (as a reminder!).
2. Click *Next* when finished.

Step 3:

- "Step 2 of 2" will prompt you fill in the arguments. To enter cell addresses in Step 2, you can either type the addresses or click on the cells themselves. The result of evaluating the function will appear in the top right of the dialog box. Click *Finish* to close dialog box.

## Arguments in Excel Financial Functions:

Excel Name	Role or Meaning
<b>Pv</b>	Present Value; value at the beginning of the 1 <sup>st</sup> time period(compounding period)
<b>Rate</b>	Interest Rate per time period (per compounding period)
<b>Nper</b>	The number of time periods (compounding periods)
<b>Pmt</b>	The constant sized payment made each time period (compounding period)
<b>Fv</b>	Future value; the value at the end of the last time period (compounding period)
<b>Type</b>	0/1 code indicating the timing of payments (0: pay at <b>end</b> of the time period; 1: pay at start of time period)

### **Important:**

- The above functions all assume and required that equal periodic (annual, monthly, etc.) payments are being made.
- Do not enter commas or dollar signs with the payments. If we include a comma to mark off the thousands, Excel will think that the comma is separating two different arguments. So "475,000" should be entered "475000".
- *Given any four of the five parameters (PV, RATE, NPER, PMT, FV), there is a financial function to calculate the fifth.* For the PMT function we know the present value, interest rate, the number of periods, and the future value. PMT tells us the amount of periodic payment.

## NET PRESENT VALUE:

**Definition:** The net present value (npv) of an investment is the total value of each of the cash flows for the investment stated in terms of today's dollars. In the NPV function, these cash flows may vary over the future period and need not be constant, whereas in the PV function cash flows are defined as constant. NPV calculations make use of discount rate.

**An Important Note:** The NPV function is somewhat mislabeled. The NPV function does not calculate the net present value of the investment. Rather, the NPV function calculates the present value of a series of different future cash flows that occur at fixed intervals. *The net present value is then calculated by subtracting any initial investment ( $C_0$ ) that might be made right now.*

### Decision Rule:

- If  $NPV > 0$ , the investment is a good one relative to the discount rate and the investment should be made.
- If  $NPV < 0$ , the investment is a poor one relative to the discount rate and investment should not be made.
- If you were comparing two potential investments, you would choose the investment with the higher NPV.

### Arguments:

NPV (discount rate, cash flows)

You can highlight the cells with the relevant information.

- = NPV( A4, A8:A11) where the discount rate is A4 and the cash flows over 4 time periods are listed in cells A8 through A11.

Or, you can type in the explicit cash flows as sequence of arguments in the NPV function. So:

- = NPV (6%, 2000,3000,4000,-5000) – 1000

### An Example of Application Context:

A bond will pay \$600 in one year, \$700 in two years and \$800 in two three years, when it matures for \$10,000. What can Jeff pay for the bond if the annualized rate of return is at least 10%?

*Answer:* Jeff can pay up to \$9471.07. (if he can buy the bond for less than this, his annual rate of return will exceed 10%).

## INTERNAL RATE OF RETURN:

**Definition:** The internal rate of return (IRR) for a investment is such that  $NPV=0$ . As in the NPV function, these cash flows may vary over the future period and need not be constant, whereas in the PV function cash flows are defined as constant.

**An Important Note:** NPV is preferred to IRR rankings, as the latter have several shortcomings:

1. The IRR evaluation criteria varies according to borrowing or lending activities.
2. Some projects have different or multiple rates of return over their lifetime (or in some cases no IRR exists).
3. IRR is misleading in making comparisons among mutually exclusive projects (unless we examine incremental expenditures). IRR should not be used to rank and order projects because it fails to identify real-world capital constraints and which have the largest NPV value.
4. IRR tends to be overstated for short-lived projects with little up front investment. Such projects may not contribute much to the overall value of the firm.

### Decision Rule:

- If  $IRR > \text{discount rate}$ , the investment is a good one relative to the discount rate and the investment should be made.
- If  $NPV < \text{discount rate}$ , the investment is a poor one relative to the discount rate and investment should not be made.
- If you were comparing two potential investments (at the same discount rate), you would choose the investment with the higher IRR.

### Arguments :

IRR (cash flows, guess)

- The first argument to the IRR function is the range of addresses where the series of cash flows is located on the worksheet. The cash flows should be in sequential cells, in either a row or column. The period of time from one cash flow to the next should be the same. The resulting rate of return is for that period (year, month).
- There must be at least one negative number (representing initial investment,  $C_0$ ) and at least one positive number (representing amount received) in the cash flows- or else there will be no IRR!
- It is possible to list the cash flows explicitly by placing them in curly brackets  $\{\}$ :  
 $= \text{IRR} (\{-10000,2000,3000, 4000,5000\})$  here  $IRR = 23.54\%$

### An Example of Application Context:

Akbar buys a stock for \$10,000. The stock pays dividends of \$350 one year later, and \$450 two years later, when it is sold for \$12,500. What annualized rate of return did Akbar earn?

*Answer:* The IRR of Akbar's stock is 10.038%

## **FUTURE VALUE:**

**Definition:** Future value (FV) function calculates the future value of an investment assuming constant periodic payments and a constant interest rate through out the life of the investment.

**An Important Note:** You must determine the time period involved in the investment and state all information relative to this time period.

### **Arguments:**

FV (rate, nper, pmt, pv, type)

### **An Example of Application Context:**

Lisa has \$20,000 to invest right now. Each year she plans to invest \$5000 more with a rate of return of 8%. How much will her investment be worth in 10 years?

### *Answer/Solution:*

- All the information is stated in terms of years. The annual rate is 8%. The number of years of the investment is 10. The annual payment is \$5000 out of her wallet (pmt). The present value is -20000, our initial investment. And she plans to make her annual investment at the end of each year: so the type of the investment is 0 rather than 1.
- The formula would then be:  
= FV (8%,10,-5000,-20000,0)      Answer: \$115,611.31 after 10 years.

## **RATE FUNCTION:**

**Definition:** The rate refers to the discount rate.

**An Important Note:** You must determine the time period involved in the investment and state all information relative to this time period.

### **Arguments:**

RATE (nper, pmt, pv, fv, type, guess)

The last argument, the guess, is optional. The guess is the user's guess about what is the correct answer. The computer calculates the rate iteratively, by trial and error, so the guess is the starting point for the computer's attempts. If the guess is left off, the computer automatically begins with a guess of 10%.

### Examples of Application Context:

1. Suppose we have \$20,000 to invest and we would like to grow it into \$50,000 in 5 years. What interest rate do we need to receive?

*Answer/Solution:*

Enter = RATE (5,0,-20000,50000,0)                      answer: 20.11%

2. Bart can buy a new car for \$25,250. Instead he puts \$750 down and leases it for three years, paying \$448 monthly. The value of the car at lease end is \$13,250. What interest rate is Bart paying?

*Answer/Solution:*

Enter = RATE (3,448,25250,13250,0)                      answer: Bart's monthly interest is .7033%

### PRESENT VALUE FUNCTION:

**Definition:** Computes the present value of a series of equal payments.

**An important note:** Unlike the NPV function, the PV function can only compute the present value of a stream of *fixed* (constant) cash flows. The PV function cannot be used for variable cash flows.

#### Arguments:

PV(rate, nper, pmt, fv, type)

Note the "rate" value must match the time period over which payments are made. Again, all figures must be expressed in a common period of time. Accordingly, yearly rates must be divided by 12 to obtain monthly rates to match monthly payments. See example below.

### Examples of Application Context:

1. Willie is planning on visiting Scotland for 18 months. He figures that he will need \$2000 per month to live and \$800 for his ticket home at the end. How much money should Willie deposit in an account paying 6% interest per year to cover his needs during his stay abroad?

*Answer/Solution:*

The formula would be:  $= PV (6\%/12, 18, 2000, 800, 1)$       answer: \$35,248.57

2. How much would Apu have to invest now to be able to withdraw \$250 per month for three years and still have \$1000 left over? Assume an interest rate of 12.5% per year, with monthly compounding.

*Answer/Solution:*

Enter:  $= PV (12.5\%/12, 36, 250, 1000, 1)$       answer: Apu must invest \$8161.66

### FIXED MONTHLY PAYMENTS:

**Definition:** Computes the periodic payment required to amortize (repay) a loan over a specified number of periods. Calculates the payment of a loan based on constant payments and a constant interest rate.

#### Arguments:

PMT (rate, nper, pv, fv, type)

- Future value, fv, refers to the amount of money that will be exchanged at the end of the loan. This value is sometimes called a “balloon payment” and would be indicated as the future value.
- Again, all figures must be expressed in a common period of time.

